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Chairman: H. ALABASTER.

Commercial Editor: A. H. BRIDGE. *Joint Managing Directors:* G. H. ALABASTER, Assoc.I.E.E. E. A. GATEHOUSE, M.I.E.E., A.M.Inst.C.E. *Manager and Secretary:* E. S. MIDDLETON.

OFFICE: 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "Ageekay, Cent, London." Code, A B C. Telephone No.: Central 5871 (5 lines.)

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Association and Progress.

THE Fourth Annual Conference of the E.C.A. Allied Associations, now being held at Bournemouth, is another milestone in the progress of the electrical contracting trade, and provides an appropriate halting point from which to look back along the road it has travelled, and forward a little to what yet lies before it.

Associations in the electrical industry are to-day so much a commonplace that the other sections of it are apt to overlook the fact that it was the contracting section, its Cinderella, which showed the way to the common weal by organisation. As a matter of history, the E.C.A. was formed in 1901, at a meeting at Anderton's Hotel, presided over by Mr. Henry Alabaster, of the Electrical Review. Its first activities were applied to negotiation with the manufacturers, who were thus spurred to a similar combination of their forces in what eventually developed into the present B.E.A.M.A. Their example was followed by other sections as each felt the need of a corporate authority which could voice its aspirations; and to-day the whole electrical industry is organised into a number of powerful groups, which arrangement, we hope, is operating to their individual and mutual benefit.

The benefit could be greater if the principle of association were carried further. Trade and professional organisations have a tendency to become insular, and there is certainly scope for closer co-operation between those of our own industry. Their normal attitude to each other is of indifference, occasionally waking to suspicion and active jealousy. The indifference is foolish, and the jealousy a drag on progress. There would be less of it—there need be none—if the several electrical associations would but meet oftener and more readily to discuss in round-table amity the joint problems of the industry. Such a one is the question of the appropriate functions of each in the new and great development offered it by rural electrification. Another is that of preparing an authoritative trading register, defining the terms to which all electrical firms and large users should be entitled, some to factors', and others to trade or quantity discounts: a great and pressing problem, but no more beyond the united efforts of the industry than a similar one has proved to be beyond those of the automobile trade.

The Electrical Contractors' Association, at least, has shown itself wlling, not only to meet the others on

common ground, but on occasion to take the initiative in suggesting one. Its recent activities are symptomatic of a growing confidence, born of a knowledge of steady progress towards the strength of unity. With few exceptions, all the leading contracting firms are to-day members of it or of its allied associations; but there are a number of the smaller firms who could yet join it, with advantage to themselves and the industry. Many of them, of course, are upon the National Register of Electrical Installation Contractors; and probably a majority of the genuine contractors in the kingdom are accounted for between the two organisations. This assumption is supported by the fact that both are now finding it necessary to scrutinise with the greatest care an increasing number of applications for membership or registration, many of them by undesirables, little men with little training or experience, whose hands have been forced by the insistence of certain supply authorities on one or other of these qualifications. If the remaining authorities would but follow their example, and all consultants and architects could be persuaded to do the same, the present process of elimination of the unfit would be accelerated, and we might hope for a not-too-distant day when every reputable contractor would be within the fold, and to be outside would mean swift extinction by the brand of shoddiness.

That ideal, fraught with so much good to the electrical industry and the public, is appreciably nearer to-day than it was, say, four years ago, when the first E.C.A. conference was held. Ideals attained are not the chance rewards of indifference. This particular ideal is nearer only because it has been defined and insistently demanded; because it is being consciously striven for, with ever increasing strength and confidence; largely, be it said to their credit, by the contractors themselves, without the pressure of public opinion or, until latterly, any practical assistance from the rest of the industry.

Their Association's efforts towards that end would be the sooner rewarded if it had at least the assistance of every reputable contractor. Its membership to-day is about 1,200. How many electrical contractors, genuine and spurious, there are in the kingdom, it is difficult to say—so many spring up over-night in a back room and wither the next day in Carey Street—but after making the fullest allowance for these men of straw, there must still be many hundreds of others who might, but do not, assist, by active membership of the E.C.A., good work of which they accept readily enough the unearned benefits. In this they are like those workmen who refuse subscription to their trade union and yet claim the improved pay and conditions which it secures for its members. Their position is as incomprehensible as it is indefensible. From the narrowest point of view, membership of an association such as the E.C.A. carries with it concrete advantages, such as preferential trading terms, which are outside the possibilities of unsupported action. That is to look upon association as primarily a business matter. But it is more than that. The wider view, the view which must appeal to every man of foresight and public spirit, is that which looks upon association as a means towards the common good of his industry and the community, in which alone his individual stability and prosperity shall find a sure foundation.

Domestic Supply Tariffs.

The proceedings at the recent Convention of the Incorporated Municipal Electrical Association at Torquay once again brought to the forefront the important and much-discussed (perhaps over-discussed) subject of domestic electricity-supply tariffs. It is not our intention to express favour or otherwise for any of the great variety of systems of charging for domestic supply in vogue, except in a general way to repeat our adherence to the principle of the two-part tariff on the simplest possible lines and understandable to the consumer, at the same time looking forward to and hoping for the time when it will be possible to apply universally Dr. Ferranti's ideal flat rate.

We think it worth while, however, to focus attention on the new "Domestic Tariff" adopted by the Newcastle-upon-Tyne Electric Supply Co., Ltd., which we outline in our "Domestic Electrical Developments" columns in this issue. This appears to us, by virtue of the considerable drop in the sliding scale, to provide in substantial measure for the fixed and running charges, without in any way making the necessary complicated calculations of the supply engineer apparent to the consumer. The principle of "buy more—pay less" is one of which the average person has some sort of a conception—at any rate, it is one which he accepts without question as the normal order of things.

It is worth recalling here observations made by the "Advisory Committee on Domestic Supplies of Electricity and Methods of Charge" in its Report to the Electricity Commissioners (Electrical Review, October 29th, 1926, p. 730). "The Committee considers that none of the multi-part tariffs at present in use or suggested are sufficiently perfect for recommendation for exclusive adoption . . .; but that such tariffs of the simplest possible character should be strongly recommended for domestic supplies, and that they are of little use and will not achieve their object unless the alternative method is a relatively high maximum or actual flat rate.

"Most undertakings have the right to impose minimum charges. This has caused trouble with very small consumers, who object to paying for what they say they have not used. It is very essential, however, that the right to make a minimum charge should be retained, and in connection with multi-part tariffs it should be made quite clear that the fixed charge is in the nature of a minimum." We commend this valuable report to further and more frequent use by electricity supply engineers and managers.

Other points worthy of note about the Newcastle tariff are that some provision is made for seasonal load variations, and that the "hidden" fixed charge, which is variable with the number of assessable rooms, is on the lines of the "floor-area" tariff recommended by the above committee.

More Attention to Overseas Trade.

We have frequently referred to the list of members of the Advisory Committee of the Department of Overseas Trade as being unimpressive from the point of view of electrical trade interests. The habit of choosing one or two great men who, because of the variety of their public and other duties and the sizes of their undertakings, can hardly be expected to be able to devote that measure of attention to the real needs of the electrical trade in its desire to succeed abroad, may not have been the best. We are not alluding to the service afforded by members of the more or less permanent staff of the Department, for the limit of their activity is settled in the main by the policy of the Government and the funds that they are in the habit of placing at the Department's disposal. Who could be expected to launch out on new and useful work while Geddes and other "cuts" overhung them? We now learn that the reorganisation of the Advisory Committee is proceeding and that some well-known electrical men who have been in the fore-front of actual trading affairs for many years have been asked to give assistance. We dare hope that the newly-elected Government will see the need for strengthening the D.O.T. as a serious measure for making work for unemployed. There are few more important ways in which a man may serve his industry just now than by zealously endeavouring to encourage more definite and determined effort among

those, be they committees or firms, who ought to work harder than ever before in this overseas trade connection. It must not be overlooked that so far as this Journal is concerned we have been doing our utmost for years to bring British electrical and allied products before the actual overseas buyer. How far we have succeeded our published statistics show, manufacturers know, and we know too from correspondence received from manufacturers and our own correspondence from overseas. We have long had valuable assistance from the Department of Overseas Trade, and our hopes are high that with the strengthening of the Advisory Committee, things will become still better for ourselves and the trade generally.

Large Three-phase Transformers.

THE use of three-phase transformers, rather than equivalent banks of three single-phase transformers, has many points in its favour, including lower first cost, reduction in space occupied, and superior efficiency. It is therefore gratifying to learn from the paper on "The British 132-Kilovolt Grid," read by Mr. J. R. Beard before the E.H.P. Conference at Paris, that three-phase transformers of as high a capacity as 75,000 kVA are now actually under construction.

Messrs. Johnstone Wright and C. W. Marshall, in their paper read before the Institution of Electrical Engineers on January 24th last, mentioned 30,000 kVA as the maximum output anticipated for three-phase units. The maximum capacity has therefore increased by 150 per cent. in about six months. Difficulties of transport have been the crux of the matter, owing to the restrictions imposed by the loading gauge in this country, as these are very much more severe than those on the Continent or in America. While recognising the helpful co-operation of the railway companies, we think that British transformer designers are deserving of very great credit for the manner in which they have taken the utmost advantage of the difficult conditions.

It should be added that the difficulties were enhanced by the fact that the transformers were designed for natural cooling up to half-load and were fitted with gear for tap-changing on load.

Industry and Commerce in France.

IT is, perhaps, inevitable when business is brisk, and the activity has continued for some time, that some anxiety should be evinced with regard to the continuity of the prosperity. This is the situation at the present moment in French industries, for although in that country everyone is working—capitalist, artisan, and labourer—one learns from all sides that business is calm. This really means that firms who had sufficient orders on their books to keep their works occupied for, say, five or six months are finding that this margin is being reduced. It is needless to say that this margin is never stable. Nevertheless, if one examines the export and import statistics it is evident that since the beginning of this year the balance is less favourable from the French exporter's point of view than it was for the corresponding period of last year. As we have already shown, however, France has been obliged in the past to import largely in order to supply her requirements in the electrical and metallurgical industries. There is every likelihood of this being the case in the future, the current statistics which show an adverse tendency merely proving that French domestic requirements are continuing to absorb the greater part of her own production. The improvement in French commercial conditions which is still in evidence really dates from the legal stabilisation of the franc and the stabilisation effected by the Bank of France before the legal recognition at 124 or thereabouts. Previously with variations in exchange of ten and twenty points per day business was merely and purely a speculation. Whatever opinion one may hold regarding the figure at which this stabilisation was put into effect—for at 124 to the £, France has practically repudiated 80 per cent. of her national debt—there is no doubt that its effect has been beneficial to France and to French industries, and in any case the repudiation of 80 per cent. was preferable to an imitation of the German *débâcle*—which, indeed, was within an ace of taking place. If the figure had been put at 100 the effect would probably have been the same, but as then there would have been a repudiation of only 75 per cent. it would have been more costly. In commerce and industry it was sometimes impossible to induce holders to part with their merchandise against payment in French currency. They preferred to purchase anything, and practically at any price. With the improvement in the franc and subsequent stabilisation these holders, afraid of the inevitable fall in prices, which in many cases did take place, became keen sellers. In many quarters it is now argued that the prosperity of 1928 was largely the result of these artificial conditions, and that the true commercial basis is now being reached. In any case it is obvious that not on the stormy seas of paper inflation and business speculation is it possible to steer the commercial frigate, but that the more prosperous voyages are to be effected rather on the placid waters afforded by stability and solidity. Nevertheless, in spite of more stable financial conditions, another side of economics which is of equal importance from the point of view of everyday life—the cost of living—not only shows no reduction, but has continued to increase steadily until to-day the coefficient is at least 6 as against 1914. There is no doubt that some of the benefits which the Government has been able to effect are being nullified by additional taxation, which certainly accounts for a portion of this increase.

The Marconi Radio Royalties.

LAST week Mr. Justice Luxmoore allowed the appeals of the Marconi Co. against two decisions of the Comptroller-General of Patents directing the company to grant licences to two manufacturers under certain patents which it owns, on special terms. One case, that relating to the Loewe Radio Co., was of a special nature. The method of charging the royalties upon broadcast receiving sets is so much per valveholder. The Loewe Co. has a method of combining two or three valves in one envelope, which renders the valveholder royalty unsuitable. As the Marconi Co., however, has not actually refused a licence, terms not having been properly discussed, the Judge allowed the appeal on this ground.

As regards the Brownie Co., the Judge held that so far from establishing a new industry, the company was endeavouring to enter an existing industry on terms more favourable than existing licences were granted. His Lordship, having regard to the tremendous growth in the number of receiving sets in this country, was also unable to accept the suggestion that the royalties now charged were too high.

The Brownie case was by way of being a test action, and so confident were manufacturers that the Comptroller-General's decision would be upheld that many of them immediately decided to pay only the reduced royalties and lowered the prices of their sets. This has probably had a great deal to do with the increased popularity of portable sets, which, having four, five or more valves, would receive the greatest benefit from a reduction in royalties based on the number of valveholders.

The success of the appeal has thus placed manufacturers in an unenviable position. Not only must they restore their prices to the former level (if they are to make the same profit), but the Marconi Co. is in a position to insist upon the full royalty on all sets sold during the interval. It would appear impossible for manufacturers to claim the difference from their customers and thus they will have to bear the loss themselves if the Marconi Co. stands upon its rights.

The E.C.A. Convention.—I.

An Account of the Proceedings at Bournemouth.

WE remarked last year that the organisers of the annual convention of the E.C.A. Allied Associations had displayed great perspicacity in their choice of meeting places — Brighton, Scarborough and Cheltenham. This year they have sustained their reputation by selecting Bournemouth as the *venue*.

Those who have visited that delectable South Coast town need no commendation of ours to remind them of Bournemouth's innumerable amenities. Readers who have not yet had that pleasure will judge from the views which we reproduce on the next page that the place is well worth seeing. The sea rises on clean firm sand, there are broad promenades and carriage drives and high cliffs. The "chines," wide fissures in the cliffs, clad with trees and plants, are a notable feature of the town. They add to the beauty and health of the locality, acting as watersheds and as entries for the sea breezes which thus reach the higher town. Bournemouth has hundreds of acres of parks and gardens most beautifully laid out, and the reputation of the town as a health resort is dependent to a great extent upon its pine forests. Many places of historical interest are within easy reach of Bournemouth; the ubiquitous motor-'bus will take visitors to such places as Christchurch with its ancient Priory, Castle remains and Constable's House, Winchester, the capital of Saxon England, quiet Wimborne dominated by its Minster's twin towers, and a wide area of typical Hampshire and Dorset countryside, including the New Forest.

One of the town's principal buildings is the new Pavilion which was opened quite recently and is also illustrated herewith. The lighting in this handsome building is particularly well done and should prove of interest to contractors; some notes on the installation appeared in our issue of April 5th (p. 602).

The business meetings of the Convention which commenced yesterday (Thursday) are being held in the Town Hall; this is seen in the centre of the middle picture on the opposite page. The proceedings commenced on Wednesday with a reception in the Pavilion

Lafayette [*London.*

Mr. H. Willoughby Ellis, A.M.I.E.E.,
The President-Elect.

A. Corbett [*London.*

Mr. H. R. Taunton.

Lafayette [*Dublin.*

Mr. A. G. Bruty, M.I.E.E.

The Authors of the Papers which are being read at the Conference.

by the President of the Allied Associations, Mr. W. H. Walton. In accordance with precedent this was the preliminary to a dance in which a large gathering took part.

The New Pavilion, Bournemouth.

An early start was made yesterday morning, the first business being the annual general meeting at which the annual report, reviewed later, was presented. The Conference proper opened at 10 o'clock with an address of welcome by the Mayor of Bournemouth (Ald. C. H. Cartwright, J.P.), for which his Worship was thanked by the President on behalf of the Associations. Mr. Walton then delivered his presidential address, an abstract of which follows these notes.

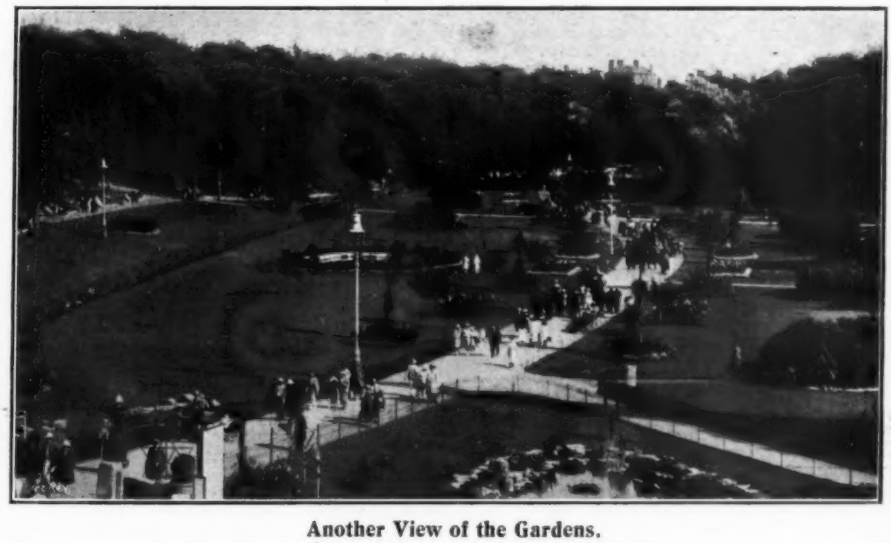
The Central Gardens, showing the Town Hall.

The report was a long and interesting one, and proved, once more, that the E.C.A. works not only to improve the status and conditions of its own members, but for the general well-being of the whole electrical industry. Several perennial matters were dealt with, including the problem of compulsory registration. With this the Association is in entire agreement, although the difficulties are thoroughly appreciated, and the inclusion of operatives in the registration is recognised as a necessity. Headway seems to have been made in connection with the operation of Clause 48 of the 1926 Act. The two greatest problems in this direction are the desire of some supply authorities to run their own appliance businesses, and the failure of some contractors to do all that is necessary to increase the sales of appliances. The report briefly reviewed the Association's educational and other activities. The principal matter, however, was the subject of fair and proper trading. A reasoned argument for a National Trading Register was put forward by Mr. Walton. He truly described the compilation of such a register as a colossal task, but he was convinced that the work would be fully justified by its beneficial reaction upon the state of the industry.

In his presidential address Mr. Walton again referred to the need for a National Trading Register. He also dealt with the manner in which the Association is bringing the importance and value of good installation work to the attention of those who have the placing of electrical contracts. This, and the similar work which is being carried out by the National Register, should have a very appreciable effect upon the general standard of wiring installations in this country. Mr. Walton also had something to say regarding those "arm-chair" critics who are content to let others do the work while they "assist" with advice in the form of complaints. We fear that the E.C.A. cannot claim to be unique in this respect.

In his conclusion, the President urged contractors (and others in the industry) to take a wider view of their work. He stressed the fact that electricity was not merely a commodity, but a universal service.

The business of the afternoon session was the reading of a paper on "The Mutual Responsibility of Contractors, Manufacturers, and Supply Undertakings: (*a*) to the Electrical Industry, and (*b*) to the Public," by Mr. A. G. Bruty, M.I.E.E., secretary of the Irish Section of the Association. Broadly, under (*a*) Mr. Bruty placed augmented goodwill, mutual recognition, and increased co-operation; and under (*b*) conscientious



Another View of the Gardens.

work and efficient service. He showed that this was not all pious aspiration, but would yield practical and remunerative results. The author had something to say regarding the variety of supply authorities' tariffs and regulations, and made special reference to the action of the Electricity Supply Board, which has been charged with the reorganisation of supply in the Irish Free State, and which Mr. Bruty charged with unfairness towards the Irish electrical contractors in the matters of installation work and the sale of appliances. After dealing with relations between manufacturers and contractors, Mr. Bruty proceeded to point out the way in which the industry could secure the confidence of the public—by providing the kind of appliance needed, by installing safe systems, and by raising the general standard of the trade. We hope to publish in our next issue an abstract of this paper and the one to be read to-day (Friday) by Mr. H. R. Taunton ("The Contractors' Part in Rural Electrification"), and to include reports of the discussions upon them. On Thursday evening there was, as usual, a smoking concert in the Pavilion.

To-day's business comprises the reading and discussion of Mr. Taunton's paper, the installation of Mr. H. Willoughby Ellis as the new President, followed by a short address and the usual vote of thanks. For the afternoon a trip to Southampton has been arranged, for a tour of inspection of the *Aquitania*. In the evening there is to be a ball and supper at the Pavilion at the invitation of the Mayor of Bournemouth. Arrangements have been made for the entertainment of those delegates who propose to stay in Bournemouth over the week-end.

Elliott & Fry] [*London.*

Mr. W. H. Walton,
President of the E.C.A. Allied Associations.

The number of delegates to the Conference exceeds 450, and is 50 more than last year's record attendance.

Presidential Address.

By W. H. Walton.

(*Abstract.*)

Commencing his address, Mr. Walton recalled that at last year's conference he had suggested that the Association's efforts should be directed along three main channels: (1) to the development of the Association itself; (2) to the promotion of better trading understandings with all other sections of the electrical industry; and (3) to securing the closest possible co-operation between members and electricity supply authorities. He proposed to review the progress made during the past twelve months in those important directions.

The Association had always concerned itself very seriously with the technical and business standing of its members, but in view of the hosts of untrained and inexperienced men who were prepared to carry out any electrical work which they could find, it had been necessary to scrutinise the credentials of new applicants for membership with greater care than ever. They were perfectly willing to confer the advantages of membership on sound and dependable men, no matter how small their individual businesses might be, but they were not prepared to recognise the untrained and inexperienced worker who was such a blight on to-day's installation trade. During the past year they had entered into the closest collaboration with the National Register of Electrical Installation Contractors to achieve identical ends. The National Register had published a list of faults which would lead to the removal of any questionable installation engineer from the Register. Electrical contractors had to put their own house in order; nobody would do the work for them. The next move of the Association had been to raise the status of all dependable installation engineers, not only within the industry itself, but also in the eyes of allied and associated professional interests. They had produced a good handbook devoted to really worthy installation work, and they hoped and believed that this would go a very long way to enlighten an important section of the community concerning the short-sighted folly and essential danger of cheap and nasty electrical work. They had been fortunate in obtaining a preface to the booklet from Mr. Walter Tapper, A.R.A., President of the Royal Institute of British Architects, in which he gave a clear lead in favour of sound electrical installation work at a fair price. They had attempted to state the case in favour of good and convenient installations and set forth the arguments against shoddy and inconvenient installations, thereby giving the architect an opportunity of appreciating the prime cause of the widely different tenders which he might receive for the same piece of work. The Association had endeavoured to maintain good relations with organised labour. The Prime Minister, in a recent appeal for industrial peace, had said that the new Government intended to get into touch with representatives of both sides, employers and employed, in essential industries, to confer with them in special work for the good of the people. It had been the consistent policy of their own Federation to confer with their operatives on any and every occasion where the common good of the trade had been concerned. With regard to the promotion of better trading understanding with other sections of the industry, concrete achievements were elaborated in his annual report. There was no doubt that very sound trading progress had been made during the past twelve months. Their delegates to other bodies and their negotiating committees had experienced little difficulty in securing an adequate hearing and thoughtful appreciation of their considered proposals. The buying power of the membership, of course, was a quantity to be reckoned with, but that power had never been applied in any coercive manner. They were criticised from time to time for their "failure" to achieve this, that, or the other thing; but, if their critics would leave their armchairs and take a personal hand in the fight, he was sure that their attitude would undergo some amendment. He knew of no other association which was so faithfully served by its honorary officers. All of them were carrying on their own businesses, and yet found time and energy to put in a great amount of work for the Association. He would say that 75 per cent. of the trading troubles of their section of the electrical industry arose as a direct consequence of discount misunderstandings and misapplications. The electrical industry lacked the close cohesion exhibited by many other trades, and provided a very happy hunting ground for those in search of illicit discounts. A reform calculated to strike at the very root of such troubles would be provided by a National Trading Register clearly defining all firms and individuals entitled to any electrical discount whatever. Recognised wholesalers would be registered as entitled to wholesale terms; recognised retailers would be registered as entitled to ordinary trade terms; while larger buyers would equally be registered as entitled to agreed quantity discounts. Trade terms, as such, would be allowed to nobody save those actually in the electrical trade or carrying on allied trades for the production of semi-electrical goods for re-sale; while all other buyers would be entitled to quantity terms or no special terms at all, depending entirely on the magnitude of their annual electrical requirements. Such a comprehensive register appeared to represent too large a task for practical and effective achievement, but certain sections of the electrical industry were already substantially organised on those lines, while in other national industries the system was in active operation with most beneficial results to the traders concerned and to the public. A National Trading Register represented the first essential step to be taken in the basic reform of any disorganised trade, and, from an electrical point of view, he commended the proposal to the very serious consideration

of the whole industry. Real progress had been made in securing closer and more businesslike co-operation between electrical installation engineers and their respective electricity supply authorities, particularly in the South of England. Although there were one or two areas in which it seemed impossible for the two sides to get together, in the balance, progress had been overwhelmingly in the right direction.

Far-seeing company and municipal supply authorities realised that a universal electrical service represented far too large, far too complicated and far too much a personal and individual matter, to be concentrated under one management and supplied from one or two central depôts, and as time went on the same view would spread into every area throughout the land. They had all taken far too small and limited a view of their surroundings. They were not engaged in pushing forward an interesting alternative to oil, candles and matches; they were promoting a universal service capable of performing every type of task in a multitude of different ways. At the present moment they had touched no more than the fringe of the comprehensive electrical service which the industry was destined to render to humanity, and such a universal service, designed to meet almost every human requirement, and arranged to suit every pocket and every taste, could not possibly be carried on as a centralised, cast-iron monopoly. Individual enterprise, initiative and personal service were at the very root of electrical progress. The industry required more and better men, more and better displays, more and better individual enterprise, and more and better personal service.

The Annual Report.

In presenting the report for the last year, Mr. Walton said that although there had been no spectacular achievement, the activities of the Association continued to increase, and progress had been made in several important directions. The membership increased during the year; the few old-established contractors in various parts of the country who had held aloof for so many years were now recognising the value of united effort, and were throwing in their lot with the Association. Success could come only by the united efforts of all engaged in the industry, and he asked the whole membership to support the Association on every occasion to the utmost of their ability. Since the last annual general meeting a certificate had been obtained from Messrs. Price, Waterhouse & Co., with regard to the overhead expenses associated with the businesses carried on by members. He could not too strongly emphasise the necessity for every member to pay adequate attention to the figures, and thus do his best to ensure that every job that he carried out bore its proper proportion of overhead expenses. The price-cutting practice of certain firms appeared to go on unchecked; but no association had been able to prevent people pursuing a policy of losing money on contracts if they really wished to do so. It was far better, however, to do a quarter of the work at a reasonable profit than to do a very great deal without sufficient margin for overhead expenses, let alone profit. A committee of the Association had utilised the information supplied by Messrs. Price, Waterhouse & Co. in its negotiations with various Government Departments, &c.; a certain measure of success had already been achieved, and more satisfactory progress would be made in the near future. The new regulations which had been introduced by the National Register of Electrical Installation Contractors should improve the status of all those admitted to the Register. During the past year close co-operation had existed between the Register and the E.C.A. which, to a very large extent, had been responsible for the new regulations now put into force. At the commencement of the year the Association supported the National Chamber of Trade in its resolution for compulsory registration. Although the National Chamber did not see its way at the time to pursue the request for compulsory registration, it had signified its intention of exploring all possible means to secure a national code of wiring rules. Compulsory registration was something which they would all like to see, but it was an extremely involved question; it would be necessary to register operatives as well as contractors. The Council had done its best to increase the usefulness to members of the Electrical Contractors' "Year Book," and had also published a book particularly directed to architects and others who were frequently responsible for giving out electrical work. This contained a preface by Mr. Walter Tapper, the President of the Royal Institute of British Architects, and was designed to emphasise the need for greater care to be exercised in considering tenders for electrical installation work. That effort would go a long way to advance the interests of those in the industry, who were anxious to carry out work of a good and sound nature as against those whose only aspiration seemed to be to carry out work of any description at the lowest possible price.

The Law and Parliamentary Committee, under the guidance of Mr. W. Cross, had been particularly active during the year. A considerable amount of time had been spent with a view to promoting the true spirit of Clause 48 of the Electricity (Supply) Act of 1926. A very large number of negotiations between the contractors and supply engineers had taken place in all parts of the country during the year, and, on the whole, the arrangements which had been arrived at had been extremely satisfactory. The chief function of the supply authority was to sell the energy which it generated, and if supply engineers were satisfied that contractors were rendering the service required to develop the consumption of energy, they would recognise the contractors' efforts in a fair and reasonable way. If contractors failed to pull their weight, and were not absolutely up-to-date in their selling of current-consuming devices, then they could not possibly deny the supply authorities' right to take a hand in the work. Mr. Bruty was reading a paper on "The Mutual Responsibility of Contractors, Manufacturers and Supply Undertakings to the Electrical Industry and to the Public." Electrical contractors had definite obligations to other sections of the industry, in addition to their direct duty to the public. One of these was to equip their public displays so effectively that they were a potent factor in the locality in which they carried on business; then there would be no need for the supply authority to enter into competition with them. The Law and Parliamentary Committee had displayed activity in connection with third-party insurance risks. The Committee had now obtained a policy which would be of the utmost utility to the whole membership. During the year the Apprenticeship Committee had been successful in organising an Advisory Committee representing all interests from the electrical and educational points of view. That Committee had produced syllabuses of a very comprehensive and useful nature, which should have the effect of improving the theoretical and practical training which was available to apprentices. The Council had drawn up "Standard Conditions for Cost plus Percentage Contracts" and "Conditions of Tender and Contract for Electrical Installation Work." Those documents were now in the hands of all members, and the forms and conditions should be utilised in place of the many varying documents which had hitherto been in use in the trade. The Council had also passed certain resolutions referring to electrical installation work for submission to the Electricity Commissioners and to the Institution of Electrical Engineers. The question of "Earthing *versus* Insulation" had been discussed at very considerable length by the Council and branches. In addition, it was considered by many outside bodies, and an informal discussion took place under the auspices of the I.E.E. The introduction of more than one phase of a supply system into one room had also been dealt with, and mainly as a result the Institution had set up a special committee to consider the whole subject, including a representative of the Association. A resolution had been sent to the Electricity Commissioners and to the I.E.E. stressing the necessity for securing the early standardisation of pressure in all areas. The activities of the N.E.C.T.A., Ltd., had been principally devoted to trading matters; the finances of all three Associations were in the hands of the company. The Trading Committee's efforts to secure a National Trade Register for the whole of the electrical industry had continued. Although the Association adhered to its policy that trade discounts should be reserved exclusively for those in the trade, very large buyers of electrical apparatus for their own use must obviously receive considerably better terms than the ordinary private buyer. Unfortunately, however, a system of quantity discounts did not seem to meet the bill. There were a very large number of industrial buyers who demanded and received the full trade discount upon their requirements, and although the efforts of the Association had gone a very long way to get rid of this objectionable practice, if one particular manufacturer or wholesaler withheld the trade discount, ways were usually found to obtain it from another source. That chaotic state of affairs could be satisfactorily corrected only by the introduction of a trade register which would indicate at a glance: Those to whom wholesale terms should be allowed; those contractors and/or retailers to whom the trade discount should be allowed; and those buyers who, for some special reason, were entitled to some discount to be mutually agreed between all sections of the industry. The compilation of such a register was a colossal task, but the utility of it would more than justify the trouble and expenditure. It was the only solution of the chaotic conditions existing in the trade. An informal committee representing the majority of interests in the electrical industry had accepted the suggestion for recommendation to all concerned. The progress made in negotiations with E.L.M.A. was of extreme importance, and would have very far-reaching results in the future. A new register had been introduced, the names upon which would be reserved as the exclusive province of E.L.M.A. retail agreement holders. Heretofore the contractor had complained very bitterly, and to some extent justifiably, that after he had carried out a large installation and supplied the first lamps, he lost any opportunity of retaining the business afterwards. By means of the new register a number of consumers were reserved definitely for the contractor. If the contracting industry satisfied E.L.M.A. that consumers were being adequately served, there was every prospect of further concessions. Relations and negotiations with other sections of the industry continued to be most cordial, and frequent meetings and discussions had taken place during the past year. Manufacturers as a whole were not out to establish retail trading facilities if they could dispose of their goods through the trade. If contractors were in a position to display fittings and current-consuming apparatus really adequately, manufacturers would much prefer the business to go through the trade. It was the duty of contractors to develop every means within their power to increase selling facilities and selling ability. To-day advertising was of the utmost importance, and some eighteen

months ago the Trading Committee placed a substantial order for illuminated signs for the use of the membership at cost price. Those signs had not secured the wide distribution that was promised; he appealed to members to take them up. So far as the National Federated Electrical Association was concerned, wages had continued to operate in accordance with the national sliding scale agreement of September, 1921, and although an application was put forward by the Electrical Trades Union for a national increase it was not granted; a 5 per cent. rise was given in the London area. The question of wages and working conditions in the industry seemed to have been satisfactorily controlled by the organisation of the Whitley scheme, and except for little outbursts in one or two districts, the relationship between the N.F.E.A. and the E.T.U. continued to be of the most cordial nature. Properly organised employers and properly organised labour were two of the most essential points for peace and progress in any industry. Mr. Walton made particular reference to the activities of the chairmen of the main committees of the Council during his year of office. Mr. Shaw, immediate past-president, had again ably directed the Development Committee in its deliberations; the Trading Committee for another year had had the admirable guidance of Mr. H. Marryat; and Mr. Robson as chairman of the Apprenticeship Committee had conducted business in an able manner during a year of record activity. Mr. Robson, after practically a quarter of a century of service to the Association, had decided to relinquish the chair of the Apprenticeship Committee, and he (the president), on behalf of the members, accorded to him their very best thanks for his services. The Labour Committee's activities, although conducted to a great extent without publicity, were none the less intricate and involved, and the Association owed a debt of gratitude to Mr. Walter Riggs, who had been chairman for the past few years, and had now retired from that office. The report concluded with an expression of thanks to members of the Council and branch officials.

The National Register.

An Authoritative Survey of the Past Three Years' Work of the N.R.E.I.C.

By A. H. DYKES, M.Inst.C.E., M.I.E.E., Vice-Chairman of the Registration Board and Executive Committee.

IN the issue of the ELECTRICAL REVIEW of January 22nd, 1926, Mr. P. V. Hunter, the Chairman, reviewed the progress of the National Register of Electrical Installation Contractors since its inception in 1924. At that time, and subsequently, there were dire forebodings of the impending demise of the Register in its early infancy. The Executive Committee was regularly lectured or abused (according to the individual proclivities of its critics) in one or other of the electrical journals for its incompetence in the management of the affairs of the Register. If I remember rightly one gentleman likened us in the columns of the ELECTRICAL REVIEW to the gods resting on Olympian heights, sublimely indifferent to the demands of their masters (presumably contractor mortals), a description picturesque but utterly untrue of the Executive's attitude at that or any other time.

Now what was, is, and must always be the position of the Executive Committee? The aim and objects of the National Register as laid down by its constitution are: (1) the protection of the public; (2) the raising of the efficiency and status of installation contractors; and (3) the improvement of installation work. It is these dominant objects that we have, and must always have, before us, and I venture to think that in many cases criticism was the outcome of misconception of these objects and the limitations imposed upon us. From some quarters came complaints that the Executive Committee was placing on the Register what are colloquially called "one-man" businesses and that in consequence some of the big contractors were deterred from applying for registration, and those who were registered would retire if the practice were continued. From other quarters came demands that the Register should issue a set of wiring regulations and impose a minimum standard of workmanship to be attained by contractors. With regard to the first, is it not obvious, in view of the three objects above detailed, that registration was never intended to be confined to the large and prosperous firms, but that the small man also should have his chance? When an application for registration is received it is first carefully investigated by headquarters and is then sent down to the appropriate Local Advisory Committee in order that it may from its own knowledge confirm, if possible, the accuracy of the statements contained in the application, and whether the work done by the applicant is satisfactory. These Local Advisory Committees, composed of members representing both the supply and the contracting interests, have now been established all over the country, and are of the utmost assistance to the Executive Committee. To the members of these local committees as also to the Scrutinising Committee (Messrs. F. W. Purse and H. J. Cash), a great debt of thanks is due. The original application with the report of the Local Advisory Committee then goes before the Scrutinising Committee and finally before the Executive Committee. If from the various reports the last is satisfied that the work of a contractor running a "one-man" business is consistently good, and that he complies with the rules and conditions of registration, then, obviously, it is the duty of the Committee to accept his application.

In view of the increasing tendency to restrict work to registered contractors, refusal to register the desirable small man would in effect prevent him from earning a living. There are many small men who are unable to undertake large contracts for the provision and erection of large plant, but are fully competent to carry out the smaller installation work, and the Committee takes the view that to exclude such men would not be in the public interest and would certainly be inconsistent with the objects laid down by the constitution. It must not be assumed, however, that the way has been made too easy. It was found necessary to define the meaning of the expression "suitable business premises" which under the rules every applicant must possess. After long and careful consideration, and bearing in mind the views expressed by the opponents of the registration of the "one-man" business, the Executive Committee has laid down a definition which has been found generally acceptable and has been of great assistance to Local Advisory Committees in making their reports and recommendations on applications for registration.

The question of wiring rules and a minimum standard of workmanship has been a matter of deep concern to the Executive Committee ever since the formation of the Register, and both subjects have been well ventilated at conferences arranged for the purpose with members of Local Advisory Committees, and representatives of the Council of the Electrical Contractors' Association at which frank and free discussion on these and kindred subjects has taken place. It has been proved and admitted that as the standard of workmanship varies in different parts of the country and for different classes of installation, to attempt to impose an arbitrary standard would be impolitic at the moment, and would antagonise many well-wishers and supporters of the Register, and, whilst the I.E.E. Wiring Regulations are regarded as the ultimate stan-

dard to be aimed at, insistence on strict compliance in every respect with those Regulations is not practicable at the present time. It has, however, been thought advisable to compile a list of examples of faulty wiring work, the commission of which is incompatible with the class of workmanship which is required of registered contractors. This list, with notes on its implications, has been circulated to every registered contractor, and has met with general approval. It is proving of great assistance to Local Advisory Committees when reporting on the work of applicants for registration and making their recommendations, and will be a help and guide to the Executive Committee itself when it is called upon to deal with complaints of bad workmanship. It may be found advisable, as time goes on, to add to this list in order to attain those objectives of the National Register already mentioned. In the past three years there have been several complaints against registered contractors. These have been at once investigated, and, where necessary, members of the Association of Consulting Engineers have been instructed to inspect the work complained of and to report, and the contractors concerned have been called before the Executive Committee to give their explanations. In some cases where there were extenuating circumstances the contractors, as a condition of remaining on the National Register have been required to put right or remedy at their own expense the faults complained of; in others, where the explanations tendered were deemed insufficient, their names were struck off the Register.

During last year we saw our way for the first time to undertake a moderate publicity campaign, limited, of course, by the means at our disposal.

Reverting now to the figures given in Mr. Hunter's article, he stated that at that date 930 contractors had applied for registration and 804 of those applications had been accepted. It will be seen from the figures given below that the progress which he mentioned has been fully maintained. They show the total number of applications received up to the end of the December in each year, from which it will be easy to deduce the number of applications received in respect of each year. They show also the net number of contractors on the Register at the same dates. The difference between the total number of applications for registration and the number of names on the Register is due to applications which were declined, together with those which, at the particular dates, were under investigation and consideration, and also those names which, at one time on the Register, have been deleted for various reasons, such as death, bankruptcy, retirement and other casualties.

	Total applications received	Net number on Register
Up to December 31st, 1926. ...	1,173 ...	946
December 31st, 1927. ...	1,348 ...	1,049
December 31st, 1928. ...	1,584 ...	1,150

Up to the date of this article 1,703 applications in all have been received, and the number of names on the Register is now 1,247. These last figures, assuming the rate to be maintained, show greater progress than in the earlier years, and appear to indicate that the real aims and objects of the National Register are becoming better appreciated by both contractors and those having orders to place. With regard to the latter, the Executive Committee has convincing evidence that local authorities, consultants, architects and others placing electrical work are to an increasing extent confining their inquiries and orders to registered contractors, and advertisements appearing from time to time in the technical Press inviting tenders support this statement.

In view of the foregoing record of facts and figures the Executive Committee feels that it is not unreasonable to claim that the National Register has made, and is making, sure and satisfactory progress towards the attainment of the objects for which it was incorporated.

The I.E.E. in France.—II.

An Account of the Summer Meeting.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

A CONSIDERABLE time has elapsed since last the Institution of Electrical Engineers ventured forth as a body from its native shores. Foreign travel has considerable educational advantages; hence the exceptional opportunity that French engineers offered to their British *confrères* was accepted by a party of I.E.E. members and their ladies numbering about 133, of which over 100 took part in an extension of the visit to the Pyrenees.

Far from being a "joy ride," the trip was more like hard work, for on several days as many as twelve hours were needed to fit in the prescribed inspections of factories and electricity generating stations. During the first stage all went according to plan, and, except for a few showers in Paris, the weather was brilliantly fine

In Paris the main programme consisted of a survey of all the power stations that provide the city and its suburbs with electricity, as was indicated last week. With the exception of the Ivry station, they are all located on the River Seine as it leaves the city at St. Ouen and St. Denis. The aggregate capacity of the plant is 300,000 kW, while that of Ivry is 60,000 kW (with space for extension to a total of 130,000 kW). The Ivry station has been placed at the junction of the rivers Marne and Seine at the point where they enter the city, on account of the limitations of the Seine in providing adequate condenser-cooling water in the vicinity of the other stations. In fact, one wonders how much longer the Seine will serve for this purpose at the present rapid rate of development of the use of elctricity, more particularly during the dry season. All the stations are fairly modern and are steam-turbine equipped. The chief impression they give is that of an enormous amount of space in the buildings; in fact, extravagantly so. Further, the auxiliaries and steam piping do not seem to be at all compactly and efficiently arranged. The switch-house at Gennevilliers attracted a lot of attention on account of its great size, being virtually out-door plant contained within a building. It will be recalled that this undertaking was a pioneer in laying single-core 60,000-volt cables, and it was ascertained that the pioneer work was not without its troubles, for about two hundred faults had occurred.

One hears a good deal in England of the pros and cons of the standardisation of frequency, so it is of interest to know that some years ago this was taken in hand in Paris and is now practically completed at 50 cycles. The City was systematically tackled section by section, extra temporary bus-bars being provided in the sub-stations to facilitate the changing-over of the feeders, which involved dealing with over 16,000

electric motors. As the latest example of French central-station practice, the Ivry plant attracted most interest. It supplies the Paris underground railways, which are shortly to be extended beyond the fortifications; the latter are being rapidly removed, since they are no longer of use for military purposes.

Fig. 1.—A Group of Members at Ivry.

A High-voltage Laboratory.

The visit of the I.E.E. to the Ivry station and to the million-volt testing laboratory of the Compagnie Electro-Céramique, also at Ivry, was made jointly with the members of the E.H.P. Conference (this year there were 42 British members at the Conference, who presented 19 papers out of the total of 108). An impressive range of typical tests had been staged to demonstrate the possibilities of the equipment. For testing insulator strings, the pressure was increased in steps of 100,000 volts; at 200,000 volts corona discharge commenced and all the connections could be discerned in the dark, outlined by the brush discharges. The length of the insulator chain was selected so as to break down at a million volts, and it was impressive to see the flash-over in a nearly steady solid stream, which was maintained for a second or so to enable the visitors to appreciate fully the phenomena. It was certainly a very spectacular and most interesting display. The advantage of metal rings on insulator chains was demonstrated. Other experiments were also carried out to demonstrate the various test methods employed. Lt.-Col. K. Edgcumbe, with his excellent knowledge of French, assisted in translation.

Wireless Station and Factory.

The huge Saint Assise wireless station was the object of one of the visits. The chief items of interest there were the enormous steel masts and the La Cour frequency changers. On leaving the wireless station, a break in work was made to see Versailles, where the party was entertained to tea, after which a visit was paid to the Etablissements Edouard Belin, which are now world famous on account of their successful apparatus for the wire and wireless transmission of photographs, sketches, printed matter, &c. Twelve of their larger machines are in use in England by newspapers. A very clever piece of apparatus for home reception of pictures was also on view. It is being manufactured in large numbers in readiness for sales to commence next month, when the broadcasting of pictures will take

Fig. 2.—Messrs. Young, Chattock and Lt.-Col. Cortez Leigh.

Fig. 3.—Mr. Howard (behind glass) and Mr. and Mrs. Garrard.

Fig. 4.—Lt.-Col. Cortez Leigh, Mr. and Mrs. Lawson, Major Amberton and Mrs. Chattock.

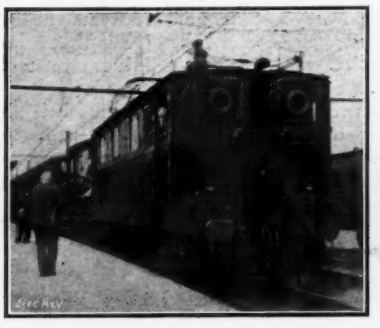


Fig. 5.—Special Locomotive at Vierzon.

Fig. 6.—Members at Eguzon.

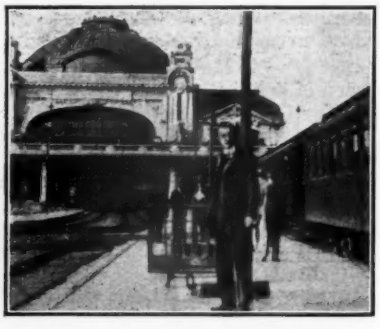


Fig. 7.—A Stop at Limoges.

place regularly from French radio stations. These amateur receivers are operated by a gramophone clockwork motor, which drives the paper cylinder through a clutch. The latter is operated electrically by means of the signal forwarded by the transmitter, and thus the cylinder is momentarily stopped and re-started at each revolution (it being driven a trifle above synchronous speed) and thus is forced to keep in correct step with the transmitter. Before placing a sheet of paper on the cylinder, it is steeped in potassium ferrocyanide. The varying currents transmitted cause correspondingly greater or less chemical action on the paper. The transmitted picture comes out in blue and white, and is a very satisfactory reproduction. It can be intensified, if so desired, by placing it in a hydrochloric acid bath. Each picture takes five minutes to reproduce.

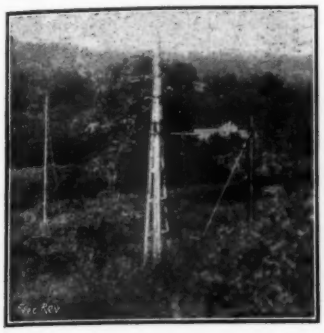


Fig. 8.—Transmission Line in the Midi.

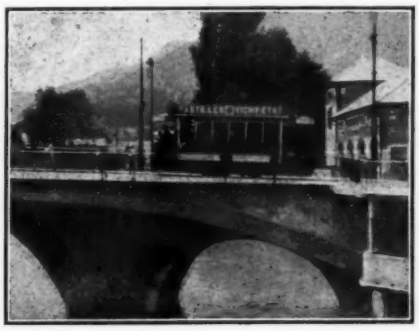


Fig. 9.—The Bridge at Lourdes.

Fig. 10.—The Fort, Lourdes.

A Large Electro-magnet.

On another day the monster 46,000-gauss electromagnet at Bellevise was inspected. The coils are about ten feet in diameter and six feet long. Their distance apart can be varied. As the inductive effect of the windings is considerable, care has to be taken to switch on and off through resistances. A strong stray field, extending about six feet, drew the visitors cameras and steel objects unexpectedly towards it.

Some interesting experiments were in course of progress on the strength of dams for hydro-electric work —several tons of mercury was employed in place of water to obtain more effective test heads on a small scale.

Out of the five days spent in Paris, one only was allotted for sight-seeing, when the party visited the Chateau de Chantilly. Among other objects seen was the famous large rose-tinted diamond, the theft of which attracted so much attention in the English newspapers a short time ago. Its dramatic recovery will be recalled; the thief hid it in an apple, and his landlady's servant discovered it when peeling the apple.

Social Functions.

The only social function during those strenuous days was a banquet offered to the I.E.E. visitors jointly by the Société Française des Electriciens; la Compagnie Parisienne de Distribution d'Électricité; and le Groupment des Secteurs de la Region Parisienne (the Paris suburban electricity distributors). The president of the Society (Mr. Bunet) presided, supported by the chairman of the Paris Supply Co. (Mr. Malegarie) and the chairman of the suburban distribution authorities (Mr. Girousse). Among the guests present were representatives of the British Ambassador and of the British Consul, Messrs. H. Cahen (president of l'Union des Syndicats d'Électricité), Moutier (president of the French Civil Engineers), Geoffroy, Schwarberg, Mariage, J. Rey, P. Eschwège, and Fabry. Several representative members of the E.H.P. Conference, which was being held in Paris concurrently, were also among the guests, *viz.*, Messrs. Ulrich (the president), C. O. Mailloux,

Fig. 11.—The I.E.E. " Pilgrims " at Lourdes.

U. del Buono, Parodi, Imbs, and R. Borlase Matthews. Mr. Grosselin was a guest in his double capacity as a

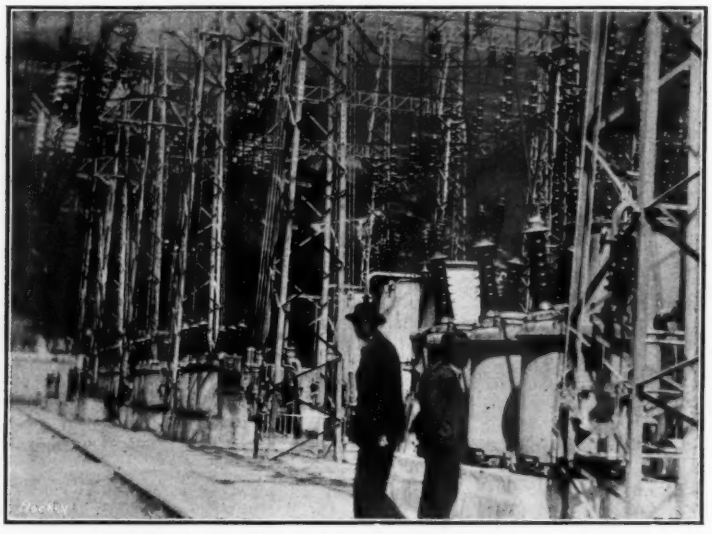


Fig. 12.—Open-air Switchgear at Le Hourat.

member of the Society and as the indefatigable hon. secretary of the I.E.E. in France. Lt.-Col. K. Edgcumbe, president of the I.E.E., received a great ovation, for in returning thanks for the hospitality extended, he spoke most readily and colloquially in the French language, telling a humorous story and even making puns. The Frenchmen greatly appreciated the compliment, and it was a relief after the somewhat ponderous orations that had been delivered in true French style by the hosts. A wonderful *menu* was presented, which might well serve as an example for the I.E.E. annual dinner.

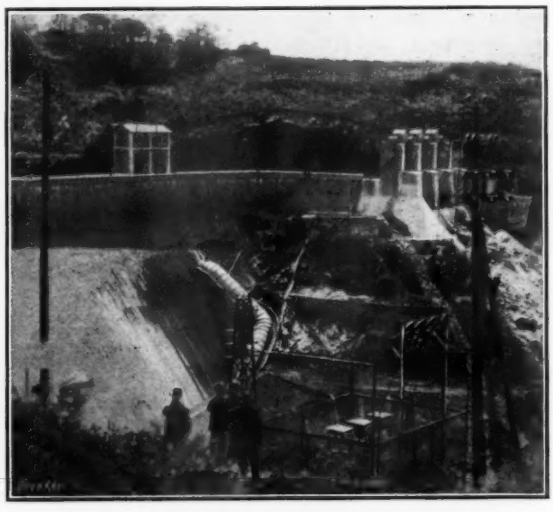


Fig. 13.—Eguzon Water-power Station.

While in Paris, a separate programme was arranged for the ladies, including visits to Messrs. Worth's (the dressmakers) and Boucheron's (the jewellers), tea at the Ecole Supèrieure d'Electricité, and trips to Versailles and Chantilly.

At the end of the week the party divided, some returning and over 100 proceeding to spend a week in the Pyrenees to inspect the railway electrification, hydro-electric stations, electrochemical and electrolytic works, and, incidentally, to see the beautiful country and mountains that France possesses in those parts.

The Pyrenees Trip.

The party for the Pyrenees visit left Paris on Sunday morning, June 16th, in perfect weather. A special train was provided by the courtesy of the Paris-Orleans Railway Co., and for the first 120 miles was drawn by an electric locomotive. At Vierzon, which is the terminus of the electrified portion of the line, a short halt was made before proceeding to Eguzon. The electrified section of the line was of great interest; the locomotives are fed from an overhead line at 1,500 volts direct current, and power is supplied from eleven sub-stations of the rotary-convertor type. The two sub-stations actually in Paris receive current at 13,200 volts, the remainder at 90,000 volts.

At Eguzon the party was transferred to motor coaches for the short journey to the hydro-electric station of the Union Hydro-Electrique, first visiting the large open-air transformer station situated on the hill. This station is the terminal point of the 150,000-volt line coming south from Paris, and it transforms the 10,000-volt power generated by the Eguzon station to 90,000 volts, at which pressure it is fed back along the line from Vierzon, and thence to Chaingy and Chevilly.

The dam at Eguzon is 61 metres in height, providing the water turbines with a fall of 55 metres, fed through a 12-ft. welded pipe. The five generators are rated at 12,500 kVA, the station having a total capacity of 50,000 kW. Rejoining the motor-coaches, a further short journey was made to San Sebastien, where the train was waiting to proceed to Bordeaux, which was reached soon after 9 o'clock.

Monday, June 17th, was largely occupied with travelling, though members had an opportunity of looking round Bordeaux in the morning. On arrival at Pau, some of the party proceeded at once to the rectifier station and afterwards to a chateau, which is said to be the birthplace of Henri IV, a special feature of which was the magnificent collection of Gobelin tapestries.

The British members were then entertained at dinner by the South-Western Centre of the

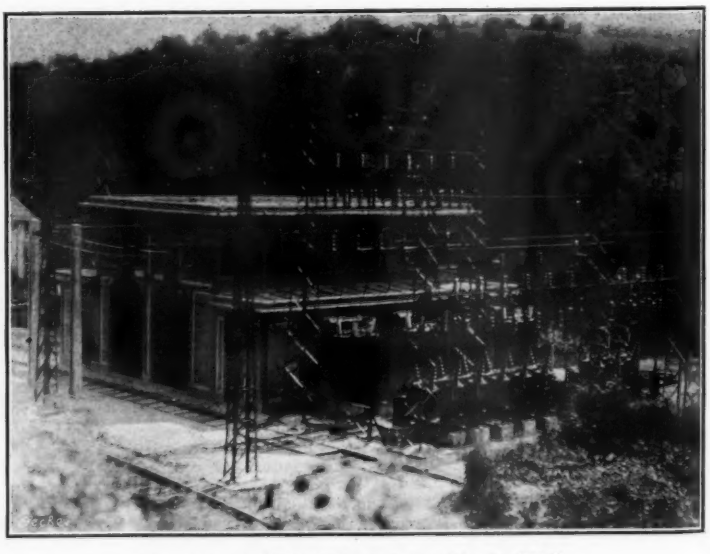


Fig. 14.—A Sub-station of the Cie du Midi.

Société Française des Electriciens. A speech of welcome was made by the president of the Centre, who was

supported by Mr. Bunet, president of the Société. Lt.-Col. Edgcumbe replied in a very happy manner, partly in French and partly in English, and took the

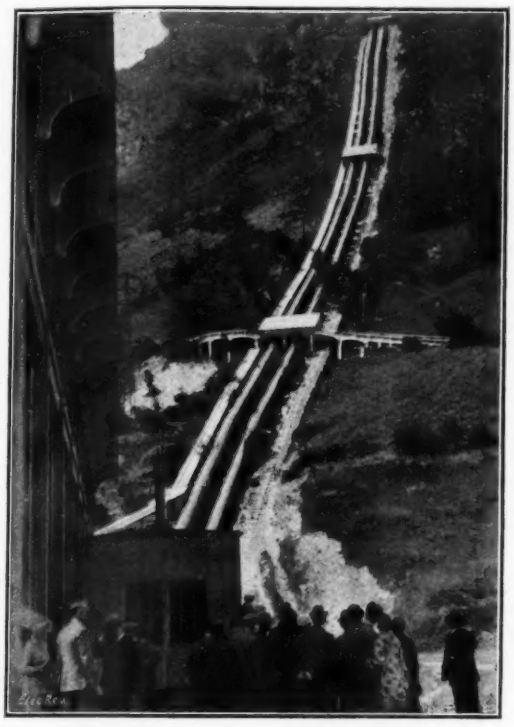


Fig. 15.—Pipe Line at Le Hourat.

opportunity of presenting a silver salver to Mr. Grosselin, secretary of the French Institution.

On Tuesday morning, June 18th, the train was abandoned for motor coaches and a journey made through beautiful country at the foot of the Pyrenees to Eaux-Bonnes, where luncheon was taken. On the way to Eaux-Bonnes, a visit was made to a sub-station of the Cie du Midi and also to the water-power station of Le Hourat, which is equipped with five 8,000-kVA generators running at 500 r.p.m. and generating at 10,000 V.

One feature of great interest to members was the installation in the same station of two rotary convertors, rated at 750 kW, 750 r.p.m., which convert to 1,500 volts on a single commutator. This station is semi-automatic, one machine going into operation when the other becomes overloaded.

The afternoon was devoted to climbing over the Col d'Aubisque, which is one of the highest passes in the Pyrenees, the road at the summit reaching some 5,400 feet. This drive amid wild mountain scenery and the decent to Argelés will remain an unforgetable memory for most of the party.

The Tuesday night was spent in Lourdes. On the Wednesday morning the party drove in motor-coaches to Pierrefitte-Nestlalas and visited the works of the Société des Phosphates Tunisiens at Soulom. Luncheon was served at Gavarnie.

During the afternoon the generating stations at Luz of the Société des Forces Electriques de la vallée de Gavarnie and of the Société Hydro-electrique de la Cère were inspected, returning to Lourdes for dinner.

The Thursday was spent in travelling, except for a short morning visit to the electro-chemical works at Lannemezan of the Société des produits Azotés (nitrogen compounds). Toulouse was reached by special train at about 3 o'clock, and members were then taken for a drive round the town and paid a short visit to the hydraulic laboratory of the Electro-technical Institute at Banlévé.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

Electrical Review Index.

The Index to Vol. CIV (for the half-year ending June 30th, 1929) will be published shortly, and we shall be glad to receive the names and addresses of those who require it (free of charge) for binding purposes or wish to retain it for reference. Application should be made as early as possible to the Publisher, 4, Ludgate Hill, E.C.4.

Large Power Station Contract.

The West Midlands Joint Electricity Authority has placed an order with the British Thomson-Houston Co., Ltd., for the complete electrical generating plant required for the first section of the new base-load power station being erected at Ironbridge on the River Severn. Included in the contract are a 50,000-kW turbo-alternator, three 21,000-kVA outdoor-type transformers, 33,000-V switchgear, and the necessary auxiliary equipment. The turbo-alternator consists of a 50,000-kW maximum continuous rated two-cylinder double-flow steam turbine with a direct-coupled three-phase 11,000-V 80 per cent. power factor 50-cycle alternator provided with B.T.-H. closed-system air cooler. The turbine is designed for a steam pressure at the stop valve of 375 lb. per sq. in. gauge, 750° F. total temperature. The condensing plant will be manufactured by Hick, Hargreaves & Co., Ltd. Connected solid with the alternator are three B.T.-H. single-phase oil-immersed self-cooled outdoor-type transformers arranged in delta on the primary side and in star on the secondary side, giving 33,000 V between phases. These transformers are stated to be the largest self-cooled units ordered in this country for power-station service. All switching is effected at 33,000 volts. The cooling water for the condensing plant will be taken from the River Severn, a separate pump-house being erected on the river bank for this purpose. Messrs. Drysdale and Co., Ltd., will act as sub-contractors for this part of the contract.

Wages in the Cable-making Industry.

We have received from the Joint Industrial Council for the Electrical Cable-Making Industry a schedule of the rates of wages which will come into operation on the third pay-day in July consequent upon an alteration in the cost-of-living figures.

Conditions in Sweden.

The *Swedish Economic Review* (the official organ of the Swedish Board of Trade) states that during the first quarter of the current year the mechanical workshops and shipyards showed improved employment figures generally. On the other hand, the position in the electrical trade was worse than during the immediately preceding quarter. During the first four months of the year electrical machines valued at 9,475,000 kr. (£526,000) were exported, as compared with 13,351,000 kr. (£740,000) in the corresponding period of 1928. The exports of telegraph and telephone apparatus, however, rose in value from 3,636,000 kr. (£202,000) to 4,285,000 kr. (£238,000).

Recent Contracts.

BIRMINGHAM ELECTRICAL FURNACES, LTD., has received from Morris Commercial Cars, Ltd., an order for an electric box-type carburising furnace complete with a "Birlec" 4-arm charging machine, turntable, loading trolleys, &c. This furnace, which has a usable hearth 9 ft. long by 5 ft. wide and a maximum rating of about 185 kW at 440-V, 3-phase, will be one of the largest electric carburising furnaces in this country.

The HART ACCUMULATOR CO., LTD., informs us that the following telephone exchanges are among those for which orders for batteries have been received:—Dewsbury, Grimsby, Stanmore, Edinburgh (Granton), Santiago and Malta.

We recently reported that the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., had received an important contract for 21 electric locomotives from the Great Indian Peninsula Railway. The electrical equipment of each of these locomotives includes an "Exide-Ironclad" battery of 24 cells, type LMV.3, manufactured by the CHLORIDE ELECTRICAL STORAGE CO., LTD.

E.D.A. Activities.

The British Electrical Development Association has produced an attractive little brochure setting forth its constitution, objects and work. The arrangement adopted is to place side by side a description of a certain branch of activity and illustrations relating to that subject. Thus it is mentioned on one page that during the last few years E.D.A. has spent nearly £100,000 on national Press advertising, and on the opposite page there appear reproductions of some of the advertisements which have been employed. Another pair of pages mentions the circulation of booklets and leaflets, and illustrates a number of examples. In giving details of the Association's lecture service, the booklets which are available for the lecturers are also illustrated. Other sections deal with window displays, posters, films, and other familiar features of E.D.A. work. At the end the division of the country between the Area Sub-Committees is depicted, and the personnel of these bodies is given.

Fig. 1.—The July-August Window Display.

Fig. 2.—An E.D.A. Poster Stand.

The July-August supplementary programme shows that efforts are being directed to the stimulation of "other" uses of electricity (*i.e.*, apart from cooking, heating, &c.). The window display (illustrated herewith, fig. 1) accordingly contains a miscellaneity of appliances such as saucepans, kettles and percolators. The cardboard lady is being made to give good service; this is her third appearance. In fact, the whole display is a regrouping of material already supplied, supplemented by appliances from stock. All the usual assistance is available in the form of posters, booklets, &c. The programme includes an illustration (reproduced herewith, fig. 2) of a special stand bearing six frames in which E.D.A. posters can be mounted. This could be usefully employed in showrooms, and the public part of supply authorities' offices.

New Italian Companies.

Among the companies recently formed in Italy are the Società Idroelettrica Venaschese, Venasca (Cuneo), capital 1,200,000 lire; and La Società Elettrica Ploaghese, Ploaghe (Sassari), 600,000 lire.

The German Radio Industry.

According to the annual report of the Verband der Funk Industrie, Berlin, the value of the production in 1928 was more than twice that of the previous year. The number of subscribers increased from 2,009,842 in 1927 to 2,635,567 last year, and a large number changed over from the crystal receiver to the valve receiver, while the technical improvements made induced many people to substitute modern for old apparatus. Mains sets had a good reception, and the loud speaker branch also had a share in the favourable development. The total turnover in valve sets represented a value of 30,000,000 marks, while that of the member firms producing loud speakers was of the value of 10,000,000 marks. A considerable decline took place in the sales of detector apparatus, headphones and components. At the end of 1928 the Association had a membership of 104.

Repair or Small Job Cards.

We have received from Messrs. JAMES MCQUEEN, LTD., Moat Road, Leicester, specimens of a repair or small job card in which provision is made for details of labour, materials and other expenses to ensure that all charges are accounted for. There is also included a profit and loss account form to be made out upon the completion of the work. A pamphlet containing instructions for filling in the card accompanies the specimens.

The E.C.A. of Scotland.

The annual meeting of the Electrical Contractors' Association of Scotland was held in Glasgow on June 12th, and there was a good assembly of members from the various branches. The accounts submitted showed the funds to be in a satisfactory state. The report of the Central Board dealt in detail with the various activities of the Association, and the hope was expressed that before long a fair trading agreement would be evolved which would be acceptable to all branches of the industry. A year ago a benevolent fund was established for the benefit of members and their families who were in distress. All branches had contributed to this fund, and already it had proved to be of considerable use. A satisfactory increase in the membership during the year was reported. The following office bearers were elected: President, Mr. J. Johnston Foggo, Edinburgh; vice-president, Mr. D. H. Morris (Lowdon Bros. & Co., Ltd., Dundee); and secretary, Mr. Walter Finlay, Edinburgh. The Central Board representatives are:—From Glasgow: Messrs. T. Rigg, D. Bennett, J. Allan, A. S. Nairn, H. Meighan, and R. A. Ure; from Edinburgh: Messrs. A. Pratt, R. E. Douglas, William Mackintosh, and George Lyall; from Dundee: Messrs. J. Smith and R. Kilpatrick; from Aberdeen: Mr. J. L. Anderson. After the annual meeting the members were entertained to lunch by the Glasgow Branch in the Royal Hotel, and in the afternoon the usual golf match, East *v.* West, was held at the Fereneze Golf Course, Barrhead, the West team winning by the narrow margin of one match.

Lithuanian Tariff Amendments.

The *Board of Trade Journal* publishes a list of amendments recently made in the Lithuanian Customs tariff. New rates of duty (minimum tariff) have been fixed, and among the articles affected are dynamos, motors, transformers, &c., and machinery and apparatus of copper and its alloys not specially mentioned (new rate 0.30 lit per kg. gross).

Employment in May.

The June *Ministry of Labour Gazette* says that during May employment in the engineering industry remained quiet on the whole, and showed little general change as compared with the previous month. Electrical engineering showed a slight improvement. The number of unemployed in the engineering industry was 80,090, representing an increase from 8.0 to 8.2 per cent. In the electrical engineering branch the number of unemployed fell to 3,630, and the proportion from 4.9 to 4.6 per cent. The electrical wiring and contracting

industry reported 1,133 unemployed, indicating a proportional rise from 7.1 to 7.3 per cent. Improvement was shown by the electrical cable, wire and lamp manufacturing group, in which the percentage of unemployed fell from 6.1 to 5.7 per cent., the actual number being 4,879.

Book Notices.

"*Journal* of the Institution of Engineers of Australia," Vol. I, No. 4. April, 1929. Sydney: The Institution. Price 7s. 6d.

"*Journal* of the American Institute of Electrical Engineers," Vol. XLVIII. June, 1929. New York: The Institution. Price $1.

"Speech and Hearing," by H. Fletcher. Pp. xv+331; figs. 154. London: Macmillan & Co., Ltd. Price 21s. net.

"Electrification of Steam Railroads," by K. T. Healy. Pp. x+395; figs. 165. London: McGraw-Hill Publishing Co., Ltd. Price 25s. net.

"Stores Accounts and Stores Control," by J. H. Burton. Pp. ix+144. London: Sir Isaac Pitman & Sons. Price 5s. net.

"The Wag-Tale." No. 1, 1929.—This is an amusing little magazine produced in aid of the Westminster Hospital. It contains a number of delightfully illustrated articles, and the advertising pages are of a novel character. Copies can be obtained from the Hospital for 6d. (by post 8d.).

Unemployment.

The Ministry of Labour returns show that there was an increase of 12,675 in the number of registered unemployed during the week ended June 10th. The total at that date was 1,112,800 as compared with 1,100,125 on June 3rd, and 1,149,943 on June 11th, 1928.

Prospective Trade with Russia.

The *Daily Telegraph* reports that at last week's Advertising Convention at Newcastle, Mr. Ernest Remnant, the leader of the recent trade delegation to Russia, said that although he had no admiration of the Russian political system he was satisfied that a basis of economic co-operation with Russia could be found to our mutual benefit. In the "quest for markets" Russia must not merely be included, but was entitled to first place. There was no other country which, in the next few years, could absorb such a large quantity of British manufactures. Within a few days a report upon the results of the Mission to Russia would be in the hands of the Government. It would contain a brief outline of the various requirements of Russia during the next five years which might be supplied by British industry, amounting to £200,000,000, prepared for the committee by the Governor of the State Bank. He hoped that it would be judged by purely economic and common-sense considerations, without prejudice, and especially party political prejudice. The problem of providing credit for a period of five years belonged not to industry, but to finance, and the only solution was the provision of capital in the form of a loan and investment in enterprise. Diplomatic relations were indispensable to any considerable development of economic relations, but he had always insisted that they should be conditional upon an undertaking both to compensate British nationals for their claims prior to 1917, and to cease hostile propaganda. They had asked for and obtained assurances in both respects.

The E.T.B.I. Competition.

The competition which the Electrical Trades Benevolent Institution has organised (mentioned in our last issue) is to be launched on July 1st. Books of tickets are obtainable from the Secretary, Capt. J. T. Keeping, M.C., 9, Southampton Street, W.C.1. The tickets are half-a-crown each, and bear particulars and the necessary form relating to this novel and interesting contest. Up to date 66 prizes have been presented by well-known electrical concerns and others, ranging from a box of chocolates up to a 4-valve screen-grid portable receiving set. Among the donors of prizes are the General Electric Co., Ltd., the Arora Co., the A.E.G. Electric Co., Ltd., the Artic Fuse & Electrical Mfg. Co., Ltd., Belling and Lee, Ltd., Benjamin Electric, Ltd., Berry's Electric (1928), Ltd., Berkeley & Young, Ltd., the British Thomson-Houston Co., Ltd., the Brownie Wireless Co., Burne-Jones & Co., Ltd., Cryselco, Ltd., Drake & Gorham Wholesale, Ltd., J. Dyson and Co., Ltd., the Edison Swan Electric Co., Ltd., Mr. Justus Eck, Arthur Preen & Co., Ltd., Mr. J. Fotheringham, Ferranti, Ltd., J. Gledson & Co., Graham Amplion, Ltd., Graham Farish, Ltd., Hart Bros. Electrical Mfg. Co., Ltd., Houghton-Butcher, Ltd., Lectro Linx, Ltd., Marryat & Place, Mullard Wireless Service Co., Ltd., Premier Electric Heaters, Ltd., Philips Lamps, Ltd., Siemens Electric Lamps & Supplies, Ltd., Stuart Turner, Ltd., John Shaw & Sons, Wolverhampton, Ltd., Tungsram Electric Lamp Works (G.B.), Ltd., Oliver Pell Control, Ltd., Ward & Goldstone, Ltd., and Wingrove and Rogers, Ltd. Mr. Justus Eck's prize takes the form of a pewter rose bowl for the seller of the winning ticket.

"Rubite" Automobile Wiring.

All the four winning "Bentley" cars in the Le Mans race, 1929, were wired throughout with "Rubite" cables for ignition, lighting and starting. The insulation of these cables is similar in every respect to that of the "Rubite" cables made by the METROPOLITAN ELECTRIC CABLE & CONSTRUCTION CO., LTD.

Henley's and the Contractors' Conference.

Several functions at the E.C.A. Conference are being held in the new Pavilion, and the proceedings include a tour of inspection of the Cunard liner *Aquitania*. As "Henley" cables have been used extensively in both building and ship, W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., has taken the opportunity of drawing contractors' attention to the fact by producing an illustrated brochure touching upon the subject, and including the provisional programme of the Conference.

Accumulator Manufacture in Australia.

During the past twelve months preparatory work for the establishment of a factory in Sydney, N.S.W., has been going on under the superintendence of Lucas experts from England. Supplies of Australian-made Lucas accumulators are now obtainable. Every part of the batteries is being manufactured in Australia, including plates, containers, cell lids and separators, and the lead will be obtained from Australian sources.

Flood-lighting the Paris Chamber of Commerce.

A flood-lighting scheme has been recently installed at the Paris Chamber of Commerce by Etablissements Faille & Reinhardt. The building is 108 ft. long, the height ranging from 40 ft. to 45 ft. at the highest part. To flood-light this effectively was a little complicated owing to the old and the new parts of the building varying in line of frontage. It was eventually decided to light the new part by means of G.E.C. "FB. 2505" flood-lights equipped with 500-W lamps, and the old part with

The Flood-lighted Paris Chamber of Commerce.

similar floods employing 1,000-W lamps. Most of these were concealed behind shrubs in the foreground at a suitable distance from the front of the building, the spacing being arranged to suit the old and new sections. Supplementary floods from the verandah were also employed with marked effect. The result of this system is illustrated in the accompanying picture.

For Sale.

Mr. H. J. Shaw will sell by auction, on July 3rd, at 13, High Holborn, W.C., a stock of wireless and electrical goods. (See our advertisement pages to-day.)

Catalogues Wanted.

Messrs. WARD & GOLDSTONE, LTD., ask for catalogues and advertising matter for their new depôt at Upton's Yard, 49a, Briggate, Leeds.

Irish Free State Electrical Imports.

The Irish Free State Ministry of Industry and Commerce has issued detailed figures of imports during the year 1928, comparing them with the year 1927. From these we have compiled the appended table, showing the value of the total imports of electrical machinery and cognate material into the Free State and the amount attributed to the United Kingdom, as country of shipment, but not necessarily of manufacture:—

	Total imports.		U.K. share.	
	1927.	1928.	1927.	1928.
	£	£	£	£
Electric wires and cables	109,989	224,745	47,877	78,855
Telegraph and telephone instruments and apparatus	36,182	10,299	28,428	8,599
Electric lamps and parts	47,187	83,139	40,879	39,155
Batteries and accumulators	34,248	30,710	31,888	27,972
Radio sets and parts ...	74,613	84,431	72,987	82,915
Other electrical goods and apparatus	83,679	119,675	62,560	65,989
Generators	21,830	17,798	13,088	10,991
Motors	17,625	29,979	13,911	21,208
Other electrical machinery	76,084	135,182	62,871	57,986
	£501,437	£735,953	£374,489	£393,670

As will be seen, of the total imports, £393,670, or approximately 53 per cent., as against over 74 per cent. in 1927, came from ports of the United Kingdom, leaving £342,283 for foreign countries, the bulk of which is credited to Germany.

D

Bankruptcy Proceedings.

H. PEOVER, electrical apparatus and tool merchant, Market Lane, Newcastle-upon-Tyne. The following are creditors in this recent failure :—

	£		£
Burton, C. F. and H. ...	38	London Elec. Wire Co. and Smiths, Ltd. ...	37
Blombach, Carl	22	Pattersons Accumulator Co.	21
Chorlton Metal Co., Ltd.	116	Peover, H., senr. ...	964
Fielding, Mrs. L. ...	120	Ripaults, Ltd.	28
Graham-Farish, Ltd. ...	33	Spicers, Ltd.	37
Gripso Co.	24	Turner & Co.	34
General Electric Co., Ltd.	75	Alastair McLellan & Co.	36
Kremner, L.	24		

R. BLOOD, 44 & 46, Station Road, Padiham, Lancs., wireless dealer and electrician.—The public examination herein was held on June 18th at the County Court House, Burnley, when the debtor attributed his failure to insufficient turnover and keen competition. A statement of affairs was disclosed showing ranking liabilities of £476, and a deficiency of £309. The debtor commenced trading on his own account as a wireless engineer and electrical dealer in September, 1923, with £80 capital, continuing his employment as an engineer; his wife superintended the business. It was successful for about five years, and in March, 1928, he began to devote his whole time to his business. The examination was adjourned for closing.

K. P. J. JOLIVARD, trading as Jolivard & Co., electrical engineer, 66, Victoria Street, S.W.1.—An application for an order of discharge was made on June 21st at the London Bankruptcy Court by this bankrupt, who failed last February with provable debts of £1,469. Mr. E. Parke, Official Receiver, reported that the assets had realised £74. The applicant started business on his own account in June, 1924, without capital, and carried it on until July, 1924, when he closed down owing to keen competition and pressure by creditors. The failure was further attributed to lack of capital and bad trade. The discharge was suspended for three weeks.

D. B. JOHN, trading as "D. B. John & Brothers," 8, Commercial Place, Pontycymmer, and the Nanthir Stores, Nanthir Road, Blaengarw, Glamorgan, electrical engineer, &c.—The public examination herein was held on June 20th, at the County Court, Wyndham Street, Bridgend. The debtor stated that the real cause of his failure was a loss on a contract for wiring 1,300 houses through quoting 14s. per point, whereas the actual cost proved to be 18s. per point. His father had lent him £485, but that amount had not been included in the deficiency account, which amounted to £1,005. The examination was adjourned in order that the debtor might submit additional accounts.

C. B. MARSDEN, rear of 60, Pisgah Street, Kenfig Hill, Glamorgan, electrical engineer.—The public examination herein was held on June 20th, at the County Court, Bridgend. According to the statement of affairs lodged, there was a deficiency of £141. The debtor attributed his failure to losses on small contracts, and stated that it was his intention to pay all his creditors in full. The examination was closed.

W. H. LAURENS, radio engineer, 492, Prescot Road, Old Swan, Liverpool.—First meeting held June 25th at the Official Receiver's office, Government Buildings, Victoria Street, Liverpool. Public examination, July 9th, at the Court House, Liverpool.

S. E. HUNT, electrical engineer and contractor, 8a, Torwood Street, Torquay.—Trustee, Mr. E. H. Hawkins, 4, Charterhouse Square, E.C., appointed June 15th.

R. B. LAWSON, electrical engineer, 66, Seaborn Road, Bare, Morecambe.—Trustee, Mr. H. Parker, Official Receiver, 9, Cannon Street, Preston, released June 7th.

W. R. J. WHITE, electrical agent, late of Golden House, 29, Great Pulteney Street, W.C.—Supplemental dividend of 1s. 9d. in the £ payable at Carey Street, W.C.

E. C. JENKINS, wireless dealer, 124, Cheltenham Road, Bristol.—First and final dividend of 2¼d. in the £ payable at the Official Receiver's office 26, Baldwin Street, Bristol.

J. DEAN, electrician, 4, Gogerddan Place, Aberystwyth.—First meeting, July 1st; public examination, July 11th, both at 3, Baker Street, Aberystwyth.

E. A. WARNES (Victoria Radio Co. and E. A. Warnes and Co.), electrical and radio engineer, 10, Crescent Gate, Wilmslow Road, Rusholme, Manchester.—First meeting, July 2nd, at the Official Receiver's offices, Byrom Street, Manchester; public examination, September 13th, at the Court House, Manchester.

J. A. HENDERSON (Hendersons), electrical contractor, 28a, Basinghall Street, E.C.—Trustee, Mr. D. C. Evans, 18, Ironmonger Lane, E.C., appointed June 13th.

Company Liquidations.

A.E.G. ELECTRICAL CO. OF SOUTH AFRICA, LTD.—Last day for proofs for dividend, July 3rd. Liquidator, Mr. E. T. A. Phillips, Official Receiver, Carey Street, W.C.

ASTRA DYNAMO CO., LTD.—Winding-up voluntarily. Liquidator, Mr. H. C. Faulkner, 27, Disraeli Road, Putney, S.W. Meeting of creditors, July 4th, at the Gladstone Club, Goldhawk Road, Shepherd's Bush, W.12.

CARK AND DISTRICT ELECTRIC SUPPLY CO., LTD.—A meeting of members is called for July 24th at 31, Manor Row, Bradford, to hear an account of the winding up from the liquidator, Mr. A. E. Stringer.

RADIO ELECTRIC CO. (BOURNEMOUTH), LTD.—Winding up order made by the High Court on June 18th, 1929.

Private Arrangements.

W. BOUGHEY and G. E. POWELL, manufacturers' agents, trading as Boughey & Powell, 18-24, Baldwin Street, Bristol.—A meeting of creditors was held recently, at the offices of Messrs. E. T. Collins & Son, 28, Baldwin Street, Bristol, when a statement of affairs was submitted which showed liabilities of £754 and assets of £67. It was stated that the debtors had only started trading in October last, with a capital of £50 supplied by Mr. Boughey. Recently creditors had been pressing, and some seven or eight writs had been issued. It was decided that the debtors should be requested to file their petition forthwith. The following are creditors :—

	£		£
British Vacuum Cleaner Co., Ltd.	41	Fennell System, Ltd. ...	24
B.T.-H. Co., Ltd. ...	23	Haskins Bros.	22
Chillcott & Co.	22	Hobart Mfg. Co., Ltd. ...	21
Drake & Gorham	115	Miller, A. H.	24
		Weldrics, Ltd.	125

Dissolution of Partnership.

NELSON & HALEY, plumbers and electrical engineers, 25, Grosvenor Road, Manningham.—Messrs. H. Nelson, P. Haley and S. Lister have dissolved partnership.

Wages in the Engineering Industry.

On Wednesday last week representatives of the engineering trade unions and of the Engineering and Allied Employers' Federation met in London. The trade union delegates put forward their claim for an increase of 8s. per week in the rates of time workers in the industry, with a corresponding rise in the wages of piece workers. In support of the unions' case Mr. J. T. Brownlie pointed out that the wages of engineering workers were only 50 per cent. above the pre-war level, while in a number of "sheltered" industries the increase had been as much as 80 per cent. Sir Allan Smith, for the employers, maintained that the conditions prevailing in the industry were not such as to warrant any increase. The employers did not know what the industry would have to face in the near future. He suggested that further consideration of the matter should be postponed until the end of the year. The union delegates suggested deferment for the shorter period of six weeks, but as this proved unacceptable to the employers they decided that they would report back to their committees with a view to a joint meeting of the executives being held on July 25th.

The British Industries Fair.

Application forms for space in the London section of the British Industries Fair, which is to be held next year in the reconstructed Olympia, were issued by the Department of Overseas Trade last week. A new four-storey building for the Fair is being put up at Olympia. It will not be finished until the 1931 Fair, but two floors will be complete by February next, and by means of bridging the galleries of the existing buildings and other reconstruction work, there will be a vast two-storey exhibition building. In view of the temporary contraction of space, application forms this year are being issued direct only to those manufacturers who exhibited in either 1927, 1928 or 1929, thus giving them a slight start over other manufacturers who, if they wish to exhibit, are invited to apply to the Department of Overseas Trade for the necessary forms. Space can only be guaranteed to firms whose applications are received by July 20th.

Swedish Expenditure in Russia.

In order to stimulate the interest of foreign capitalists in Russian concessions the Moscow newspapers have published statements concerning the capital investments made by foreigners in connection with concessions. It is stated, for instance, that the Allmänna Svenska Elektriska A.B. had invested 11,000,000 roubles in its Russian works up to April this year. This works, which is to begin production in October, is to turn out 30,000 motors of about 10 h.p. per annum. The present temporary works are said to have sold down to May 1st 4,400 motors of Russian manufacture. Since 1927 the concessionnaires are reported to have imported from Sweden generators, transformers, &c., to the value of 9,500,000 roubles.

New Catalogues and Lists.

TRUE SCREWS, LTD., "The Screw House," Clerkenwell Road, E.C.—A new price list of the company's screws, nuts, terminals, &c.

MESSRS. J. H. SANKEY & SON, LTD., Essex Wharf, Canning Town, E.—A folder dealing with "Pyruma" plastic fire cement. Priced.

MOFFATS, LTD., 15, Victoria Street, S.W.1.—Catalogue No. 103, illustrating and describing Moffats' "Gold Medal" electric ranges. Priced.

IGRANIC ELECTRIC CO., LTD., 149, Queen Victoria Street, E.C.—Leaflet No. 1512 dealing with the "KY" relay.

WORTHINGTON-SIMPSON, LTD., Queen's House, Kingsway, W.C.2.—A well-produced and illustrated brochure describing the various types of Worthington feed water heaters.

FERRANTI, LTD., Hollinwood, Lancs.—A booklet dealing with multi-range d.c. test sets, and containing notes, illustrated with diagrams and examples, upon some of the many uses of these sets. Also List No. Wb418/1, containing instructions for the use of the company's valve testers.

MESSRS. S. G. LEACH & CO., LTD., 26-30, Artillery Lane, E.1.—Price list No. NS.106, dealing with a.c. motors. Illustrated.

X-RAYS, LTD., 47, Red Lion Street, W.C.1.—A card, illustrated and priced, drawing attention to filing cabinets for storing X-ray films.

BAYER SOOT BLOWER CO., LTD., Lloyds Bank Chambers, 125, Balham High Road, S.W.—An illustrated pamphlet of Bayer mechanical soot blowers for boiler plant.

Messrs. JAMES GORDON & CO., LTD., Windsor House, Kingsway, W.C.—A catalogue giving details of duplex mono CO_2 recorders. Illustrated.

Messrs. HENRY SIMON, LTD., 20, Mount Street, Manchester.—An illustrated leaflet containing accounts of the installation of three pneumatic grain discharging plants at Avonmouth Docks, and the "Alphega-Plansifter" system in use at a Santiago flour mill.

Messrs. S. G. BROWN, LTD., Western Avenue, North Acton, W.—The BROWN Budget for June contains a number of interesting articles on the company's activities and products.

Social Events.

On June 15th the staff of Messrs. CHRISTY BROS. & CO., LTD., electrical contractors and electricity suppliers, Chelmsford, proceeded by train to Bristol, leaving at 4.55 a.m. From Bristol they had a long drive through Long Ashton, Wells and Cheddar, lunching at the Cliff Hotel in the last town. After inspecting the gorge and caves they went to Weston-super-Mare, returning thence to their starting points. Speaking at the luncheon, Mr. Frank Christy (director) mentioned that of the company's hundred shareholders about 60 were actually employés, while more than a quarter of the remainder were the wives or children of employés. The rest were close friends of the company.

The employés of the Metropolitan Electric Cable & Construction Co., Ltd., at the directors' invitation, journeyed to Margate on June 15th. The party left the works in a small fleet of charabancs at 8 a.m., and met Mr. James Miller (chairman) and Mr. William Brown (managing director) at Margate, where luncheon was served at 12 noon. A vote of thanks to the directors was accorded musical honours, and the chairman suitably responded. The efforts of the newly-constituted Works Band added considerably to the enjoyment of the return trip.

A party of 50 employés of Messrs. T. H. Wathes & Co., Ltd., Leicester, journeyed to Skegness by train on June 20th last for their annual holiday. A whist drive was arranged *en route* and after lunch a programme of sports was carried through. Prizes were awarded for whist, tennis, bowls and putting. Another whist drive took place on the journey home.

On June 15th the annual sports of the Metropolitan-Vickers Electrical Co., Ltd., took place at Belle Vue Gardens, Manchester. Judging by the large number of entries the sports are as popular as ever, and this year the entries included a strong contingent from the Attercliffe Works at Sheffield.

Trade Announcements.

The central stores of the METROPOLITAN ELECTRIC SUPPLY CO., LTD., has been removed to Ironbridge, Windmill Lane, Southall, Middlesex. (Telephone: Southall 1961-2.)

Messrs. FREDERICK THOMAS & CO., LTD., 189, Drummond Street, N.W.1, have appointed Mr. Thomson Coventry to be their agent in Scotland, with showrooms at 97, Douglas Street, Glasgow.

Messrs. BRUCE PEEBLES & CO., LTD., Edinburgh, have appointed Mr. G. E. Whitehead, 102, St. Mary Street, Cardiff, as their representative for South Wales and the counties of Gloucester, Somerset, Devon and Cornwall; arrangements have been made with regard to service in connection with existing plant, installations, &c.

The TUNGSRAM ELECTRIC LAMP WORKS (GREAT BRITAIN), LTD., has opened new branches at Manchester and Bristol. The Manchester premises are 9, South Street (Telephone: City 9428) and the manager is Mr. E. C. Thurley. The Bristol address is 54-56, Victoria Street (Telephone: Bristol 1620) and the branch is under the management of Mr. W. Weeks.

Polish Foreign Electrical Trade.

During April last Poland imported "apparatus, conductors and other electro-technical materials" valued at 8,550,000 zloty (about £200,000). The exports of the same class of goods were valued at 129,000 zloty (about £3,000).

The Timber Trade.

Our Timber Trade Correspondent reports that the trade in woods from the north of Europe has been very brisk in the Metropolitan district over the past month, which shows that the building trade must be very busy. Unfortunately, however, the coal and shipbuilding areas are still in a depressed state. Stocks of timber are fairly plentiful on the market, although moderate in London and the home counties in face of the good demand, and business is expanding. Arrivals of hardwoods are declining this year, largely owing to the disappointing call, especially for United States logs and lumber. The better classes of mahogany, as well as teak, rosewood, satinwood and ebony are in moderate stock, and prices for these are firm. Plywood is in great request, and fortunately is coming in freely, with manufacturers "booked up" for months ahead.

A Charitable Effort.

The works of Ericsson Telephones, Ltd., Beeston, Notts., were opened to the public on the afternoon of June 22nd by permission of the management, the occasion being an effort on the part of the Ericsson Athletic Club to augment the fund for the endowment of a cot at the Nottingham General Hospital. A nominal charge was made, and parties were conducted round the works by members of the company's staff; over 600 people availed themselves of the opportunity, and great interest was shown in the methods of manufacture and in the general organisation of the works. Particular interest was evinced in the working demonstration of automatic telephone apparatus, the routing through of calls, &c., being demonstrated by attendants. Further attractions were a tennis tournament, a cricket match (Ericsson XI *v.* Ladies XIV), a motor-cycle gymkhana, and a gymnastic display. Musical selections were rendered by the Beeston Town Band.

Prices of Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, &c.	Price June 25th.	Fortnight's inc or dec.
a	Acid, Oxalic ... ... per lb.	5¾d.	...
a	Ammoniac, Sal ... ... per ton	£60	...
a	Ammonia, Muriate (large crystal) ,,	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£25	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... ... per lb.	3½d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£13 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3d.	...
a	,, Crystals ... ... per ton	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	3⅞d.	...
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton	£95 to £100	...
b	,, Wire ... ... per lb.	1/1 to 1/9	...
b	,, Sheet ... ... ,,	1/1 to 2/9	...
p	Babbitts Metal and Anti-friction Metals—		
	Grade I ... ... per ton net	£184	...
	Grade II... ... ... ,, ,,	£130	...
	Grade III ... ... ,, ,,	£72	...
c	Brass (rolled metal 2" to 12" basis) per lb.	10¼d.	...
c	,, Tubes (solid drawn) ... ,,	1/1 to 1/1½	...
c	,, Wire, basis ... ... ,,	11½d.	...
c	Copper Tubes (solid drawn) ... ,,	1/3½	...
e	,, Bars (best selected) ... per ton	£110	...
c	,, Sheet ... ... ,,	£110	...
c	,, Rod ... ... ,,	£110	...
d	,, (Electrolytic) Bars ... ,,	£84 15s.	...
d	,, ,, Sheets ... ,,	£143 10s.	...
d	,, ,, Wire Rods ,,	£94 15s.	...
d	,, ,, H.C. Wire per lb.	11½d.	...
f	Ebonite Rod... ... ... ,,	2/8 to 2/6	...
f	,, Sheet ... ... ,,	2/8 to 2/6	...
n	German Silver Wire ... ... ,,	2/2	...
h	Gutta-percha, fine ... ... ,,	nom.	...
h	India-rubber, Para fine ... ... ,,	11d.	½d. dec.
l	Iron, Pig (Cleveland No. 3.) ... per ton	72/6	2s. 6d. inc.
l	,, Wire, galv. No. 8. P.O. qual. ,,	£21	...
g	Lead, English pig ... ... ,,	£25 5s.	5s. inc.
g	Mercury ... ... per bot.	£23 2s 6d. to £23 5s.	£1 inc.
e	Mica (in original cases) small ... per lb.	3d. to 3/-	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	10/- to 20/- & up	...
p	Phosphor Bronze, plane castings ,,	1/3½	...
p	,, ,, drawn bars & rods ,,	1/5	...
p	,, ,, rolled strip & sheet ,,	1/3½	...
p	,, ,, wire... ... ... ,,	1/6½	...
o	Platinum ... ... per oz.	£13 17s. 6d.	...
d	Silicium Bronze Wire ... ... per lb.	1/2½	...
r	Steel, Magnet, in bars ... ... ,,	7½d.	...
n	Tin, Block (English) ... ... per ton	£201 to £201 10s.	£2 dec.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
W. F. Dennis & Co.

Messrs. James Forster & Co. stated in their letter dated June 22nd that the lead market exhibited a slightly more active tone last week, consequent on a better demand from home consumers, particularly buying by the cable trade. Arrivals continue to be on the short side, but this state of affairs should be remedied before long when larger arrivals are expected. The position of supply and demand seems to be very evenly balanced, so that under present conditions it is not expected that values will alter very much from the present level.

Lighting and Power

Auchterarder (Perthshire).—STREET LIGHTING.—The Town Council has agreed to proceed with the scheme for lighting the streets by electricity.

Barnard Castle.—OVERHEAD LINES.—Mr. F. Gordon Tucker held a Ministry of Transport inquiry on June 18th into the application of the Cleveland and Durham County Electricity Supply Co. to erect overhead lines through the town. For the company it was stated that it was intended to bring electricity from Fylands Bridge, near Bishop Auckland, to a sub-station at Barnard Castle, and there would be underground cables in some streets and overhead lines in others. The Urban District Council opposed on the ground that overhead wires would be unsightly and that they would possibly be dangerous in the event of their falling. Mr. A. A. Hughes, the company's chief electrical constructional engineer, said that it would be cheaper to carry the lines overhead, and consequently the price of electricity would be lower. Mr. J. M. Heslop, an electrical engineer of Newcastle, engaged by the Council, gave details showing that even with the use of underground cables the scheme could be made profitable.

Bedford.—LOAN.—The Corporation Electricity Committee is to seek sanction to a loan of £10,000 for meters.

Bexhill.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking for the year ending March 31st show a gross profit of £12,327, as against £10,069 for the previous year. The net profit for the year was £3,028, as against £252 for the previous year.

Blackburn.—YEAR'S WORKING.—We have received from Mr. P. P. Wheelwright, borough electrical engineer, a copy of his report together with the statement of accounts on the working of the electricity undertaking for the year ended March 31st. The total revenue amounted to £216,661, and working expenses were £80,863, leaving a gross profit of £135,798. The figures for the preceding year were: Income, £203,034; working expenses, £80,131; gross profit, £122,903. To the gross profit was added an unemployment grant of £2,554, and the proceeds from the sale of old machinery amounting to £50, making a total of £138,402. After payment of capital and other charges there was a net surplus of £4,293, as compared with a net deficit of £3,463 in 1927-28, from which, however, was deducted capital expenditure charged to revenue, &c., leaving a deficiency of £7,888. Capital expenditure during the year amounted to £41,122, of which £32,704 was spent on mains and distributing plant. The sales of electricity increased from 24,471,514 to 27,868,939 kWh, while the average price obtained per kWh fell from 1.945d. to 1.812d. The total connections increased to 46,466 kW.

WHITEBIRK STATION AGREEMENT.—An agreement has now been reached between the Corporation and the Central Electricity Board concerning the terms on which the Whitebirk generating station will be taken over. The Board has decided that, whilst it is unable to take over Whitebirk as a "selected station" owing to legal difficulties, it is prepared to pay 60 per cent. of the capital charges. This will mean an estimated gross saving to the Corporation of £20,500 per annum up to the year 1934-35, as against £16,000 in the terms originally offered. With regard to the main transmission line to Preston, it was stated that the Board had been advised that this line would be required, and it would be prepared to carry the capital costs relating to it from the appropriate date.

Brierfield.—CHANGE-OVER.—Preparations are being made for changing over the supply of electricity in the town from d.c. to a.c. and a start has been made on the construction of a sub-station at the Town Hall.

Canterbury.—NEW ELECTRICITY TARIFF.—The City Council has adopted a tariff for large power consumers who can receive an a.c. e.h.p. supply, and who have 200 h.p. connected, and agree to take a minimum of 50,000 kWh per quarter. The charge is to be £4 per kVA of maximum demand, plus 0.5d. per kWh, electricity for lighting not to be more than 10 per cent. of the total used.

Chinnor.—SUPPLY INAUGURATED.—A supply of electricity provided by the Aylesbury Corporation for the village was inaugurated recently. The supply is by means of overhead lines, and the charge for all domestic purposes is 1½d. per kWh.

Colombia.—HYDRO-ELECTRIC DEVELOPMENT.—Congress has authorised the Executive to engage experts, foreign or Colombian, to prepare plans for several hydro-electric plants, chiefly to utilise the streams and waterfalls of the Sierra Nevada del Magdelena, the Central Cordillera, the falls of Honda, and the Lake of Tota, the total power from which is estimated at over 25,000 h.p. As a preliminary, governors of States in which these streams and waterfalls are situated will make agreements for experts to study schemes for electrification of railways and other uses of electricity. Each administration will prepare separate plans for the inter-municipal and departmental transmission of hydro-electric power, the erection of large central plants for production, transmission and distribution of electricity, and its adaptation to public, industrial, and domestic uses.—*Reuter's Trade Service* (Bogotá).

Dundee.—STATION IMPROVEMENT SCHEME.—At a recent meeting of the Electricity Committee the engineer stated that owing to the increasing capacity of the generating plant connected to the bus-bars at Carolina Port, and especially in view of the prospective connection with the system of the Central Electricity Board, the possible concentration of power during a short circuit was such that the e.h.p. switchgear at some of the older sub-stations was becoming quite inadequate. He therefore recommended the immediate commencement of the work of equipping adequately the main sub-stations at a cost of approximately £8,000.

Featherstone.—STREET LIGHTING.—The Urban District Council has accepted new terms offered by the Electrical Distribution of Yorkshire, Ltd., for public lighting, for 150-W lamps at £4 5s. each per annum, and 100-W lamps at £4 per annum.

Hereford.—NEW CABLE.—The Electricity Committee has obtained permission from the Corporation to proceed with negotiations with the Shropshire, Worcestershire and Staffordshire Electric Power Co., for a h.p. cable from Ledbury to Ross, principally to ensure an additional supply to the works of Edison Swan Cables, Ltd., at Lydbrook.

LOAN SANCTIONED.—Sanction has been received to the borrowing of £3,750 for overhead line extensions to Dewchurch, Dinmore, Goodrich and Peterstow.

OVERHEAD LINES.—The sanction of the Minister of Transport has been received to the erection of overhead lines in the rural districts of Hereford, Ross and Weobley for the transmission of electrical energy at pressures of 11,000, 400 and 220 V.

Hull.—YEAR'S WORKING.—The accounts of the city electricity undertaking (engineer Mr. J. N. Waite) for the year ended March 31st last show a total revenue of £360,950, as compared with £380,695 in the preceding year. Working expenses amounted to £173,631, as against £195,598, leaving a gross profit of £187,318 (£185,097), to which were added unemployment grants and excess of sinking fund investments, making a total of £191,281. After payment of capital charges there was a net surplus of £68,553, as compared with £86,249 in 1927-28. Capital expenditure during the year amounted to £299,298, the chief items being £85,523 for buildings, £127,978 for machinery, and £71,468 for mains and services. The sales of electricity increased from 70,289,545 to 74,601,164 kWh, and the maximum supply demanded from 27,700 to 29,900 kW. Developments have been made during the year in the rural districts of Sutton, Anlaby, Willerby, Melton and Welton. Supplies to Kirkella, Westella and Swanland have been inaugurated recently. Negotiations have been completed with the South Yorkshire Electric Light & Power Co. for bulk supplies at Hedon for Withernsea, and at Skirlaugh for Hornsea, and the preliminaries in connection with these supplies are now proceeding.

Irlam.—LIGHTING SCHEME ADOPTED.—As the result of a canvass of local ratepayers, the Town Council has decided to undertake an electric lighting scheme for the town. It is hoped that a supply of electricity will be available by the end of this year.

Kettering.—YEAR'S WORKING.—The report on the working of the Urban District Council's electricity undertaking (engineer: Mr. W. A. Walker) for the year ended March 31st last shows a total revenue of £70,193, and working expenses of £35,041, leaving a gross profit of £35,152. The figures for the previous year were: income, £66,525; working expenses, £36,091; gross profit, £30,434. To the gross profit was added an unemployment grant of £1,867, and bank interest of £102, making a total of £37,121 available. Loan charges absorbed £31,355, and there was a net surplus of £5,766, as against £3,480 in 1927-28. The sales of electricity increased from 7,202,836 to 7,962,776 kWh. The average price obtained fell from 2.05d. to 1.92d. per kWh.

Leeds.—YEAR'S WORKING.—We have received from Mr. C. Nelson Hefford, general manager and engineer of the city electricity department, a copy of his report together with a statement of accounts on the working of the electricity undertaking for the year ended March 31st. The total revenue amounted to £672,004, and working expenses were £250,859, leaving a gross profit of £421,146. The figures for the preceding year were: Income, £681,265; working expenses, £242,156; gross profit, £439,109. To the gross profit was added a sum of £2,942, profit on the showroom and installation department, and £2,514 from rentals of electrical appliances, making the total available £426,602. Showroom expenses and capital charges absorbed £301,153, including a contribution to the consolidated loan fund of £117,259, and from the balance £86,103 has been spent on works of a capital nature, leaving a net surplus of £39,346 as compared with a surplus of £137,186 in 1927-28. The capital expenditure during the year amounted to £588,874, making the total now spent on the undertaking £5,271,754. The sales of electricity increased from 120,385,212 to 135,498,359 kWh, and the maximum supply demanded from 54,500 to 58,000 kW. The average price obtained per kWh fell from 1.36d. to 1.18d. During the year sanction was granted to the borrowing of a further £200,000 for the construction of the new power station at Kirkstall, which, with the amount sanctioned during the previous year (£500,000) makes a total sum of £700,000, which has now been granted towards the sum of £865,000, which is the estimate for the first portion of the works. Considerable extensions of mains have been carried out during the year, the total length being 208 miles and fifteen sub-stations and kiosks were constructed and equipped.

Leigh.—LOAN.—The Town Council is seeking sanction to the borrowing of £1,251 for a h.p. supply to the mills of Leigh Spinners, Ltd.

London.—BATTERSEA.—The Borough Council Electricity Committee has authorised electricity services to 61 premises at a cost of £538; mains extensions for private services at £3,418; extensions for public lighting and conversion of gas lamps at £506; and replacement with armoured cable of old vulcanised bitumen distributors at £2,022.

HAMPSTEAD.—*Year's Working.*—The accounts of the electricity undertaking (engineer: Mr. J. Leadbeater) for the past year show a total revenue of £161,715, working expenses £120,944, and gross profit £40,771. The figures for the preceding year were:—Income, £162,170; working expenses, £107,652; gross profit, £54,518. Of the gross profit, £40,008 was absorbed by capital charges and a sum was contributed to repayment of capital outlay, leaving a net deficit of £22,383, as against a net surplus of £16,039 in 1927-28. The sales of electrical energy increased from 17,487,668 kWh to 21,306,463 kWh, and the maximum supply demanded from 10,700 kW to 12,775 kW. The average price per kWh fell from 2.23d. to 1.78d.

HAMMERSMITH.—The Borough Council has received an application for a supply of electricity amounting to 2,000 kW required for the extension of Olympia. It will be necessary to provide two 6,600-V e.h.p. three-phase mains between the generating station and Olympia, in the place of the existing single-phase mains, and also to equip sub-stations provided by the consumers with two 2,000-kW banks of Scott-connected transformers and two three-phase, 500-kW transformers, together with switchgear. At the generating station two panels and switches will have to be added to the main e.h.p. switchboard to deal with this supply. The total estimated cost of the works amounts to £13,087.

HACKNEY.—The Electricity Committee has recommended to the Borough Council the adoption of a scheme for the hiring out of British-made irons at the rate of 1s. a quarter.

Lytham-St. Annes.—SUPPLY INAUGURATION.—The Mayor recently performed the ceremony of inauguration of the electricity supply to the townships of Warton and Freckleton. The energy is supplied by the Corporation over a 6,600-V line to the main sub-station at Warton.

Macclesfield.—OVERHEAD LINE PROTEST.—The Rural District Council has decided to protest against the proposal of the Electricity Co. of Macclesfield, Ltd., to erect overhead lines at Poynton, particularly in view of the fact that an assurance had been given that underground cables would be laid. The Cheshire County Council is also opposing the use of overhead lines.

Manchester.—PROGRESS DURING APRIL.—During the month of April the Corporation electricity undertaking showed an increase in connections of 4,466 kW, bringing the total up to 386,606 kW; and the number of applications received for supply, including those for additional supplies, was 1,030, representing a total of 2,682 kW. The number of hired cookers connected increased by 81, bringing the total of hired cookers actually connected to 5,263. Applications for the hire of cookers totalled 118. Two new sub-stations were put into commission, and additional plant was installed at three existing sub-stations. The change-over from d.c. to a.c. had been completed in the cases of 5,984 consumers, and sanction had been given involving 1,791 consumers. In order to reduce the cost of l.p. distribution, application is being made to the Electricity Commissioners to approve a system using paper-insulated, lead-sheathed, compounded and water-proofed cable, laid direct in the ground without armouring, but with protective covering consisting of wooden planks, reinforced-concrete slabs, concrete, or hard burned tiles. Approval for the use of paper-insulated, lead-sheathed cable drawn into pipes or ducts, or laid solid in troughs, is also being applied for.

Marple.—ELECTRICITY SUPPLY.—The Urban District Council decided at a recent meeting to expend a sum of £38,100 on an electricity scheme for the town. It is hoped to have a supply available before the winter season.

Northern Ireland.—BANGOR.—At a recent meeting of the Borough Council it was stated that the Ministry of Commerce had granted its sanction to the borrowing of £37,750 on account of the £50,000 required for carrying out works in connection with the electricity scheme, but with regard to the proposed loan of £6,300 in respect of working capital had stated that that application would have to be made to the Ministry of Home Affairs. With regard to a further sum of £5,950 proposed to be expended on mains and services, further application could be made when the expenditure of that amount was necessary. Plans and specifications were forwarded by Messrs. Sayers & Co., the Council's consultants, and it was resolved that tenders be invited for carrying out the works.

Nuneaton.—LOANS.—The Town Council is to apply for sanction to loans totalling £8,500 for electricity services.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

SKIPTON.—Industrial power on maximum demand system: From 4d. to 3d. per kWh for first 60 kWh per quarter per kW of maximum demand and 1½d. per kWh in excess of this amount.

HAMILTON.—Standard lighting flat rate: From 5½d. to 5d. per kWh. Contract tariff rate: Fixed charge unchanged, "unit" charge from 1d. to ¾d. per kWh. Power: 2d. per kWh for the first 2,000 kWh, 1½d. for the next 12,500, 1¼d. for the next 37,500, 1d. for the next 37,500, and ¾d. per kWh for additional energy.

Swansea.—SUB-STATION EQUIPMENT.—The Corporation Electricity Committee has authorised the installation of additional switchgear and transformers at sub-stations at a cost of £1,640.

United States.—TIDAL POWER DEVELOPMENT.—According to *Power*, Dexter L. Cooper, Inc., has applied to the Federal Power Commission for a licence covering a proposed tidal power development at Passamaquoddy Bay. The proposed scheme is for the installation of plant having at the outset a capacity of 464,000 h.p., which will be increased eventually to 1,087,000 h.p. The project involves the construction of a series of dams connecting the mainland with islands across the mouth of Passamaquoddy Bay to impound tidal waters within that bay. Another series of dams is to be constructed between Passamaquoddy Bay and Cobscook Bay. The power house is to be erected at that point. In addition, there will be a series of dams across the mouth of Cobscook Bay to exclude tidal waters. A recently-adopted feature of the project is a plan to pump water from Haycock Harbour into a reservoir to be constructed on the mainland at a height of 140 ft. above sea level. Water will be pumped into this reservoir at times when excess power is available and drawn down when tidal power is at its minimum. To furnish the necessary power for pumping, it is proposed to install five 41,000-h.p. units. By utilising this power it is expected that many steam plants in Maine, in north-eastern Massachusetts, and in New Brunswick can be superseded. The scheme is estimated to cost $93,000,000, and is expected to take three years to complete.

Uruguay.—HYDRO-ELECTRIC SCHEMES.—Congress has authorised the expenditure of 300,000 pesos (£60,000) on fresh studies of hydro-electric works, and the National Council of Administration has appointed a Commission of seven engineers to complete the surveys already commenced on the Rio Negro and make similar investigations on the Salto Grande and Queguay rivers.—*Reuter's Trade Service* (Montevideo).

Tramway and Railway Notes.

Glasgow.—PINKSTON STATION.—Following on the refusal of the Electricity Commissioners to consent to the application of the Corporation to install plant at Pinkston generating station, the Tramways Committee on June 18th approved a recommendation by the Sub-Committee on Works that the following plant should be installed to replace existing plant: (*a*) Six boilers to replace 14 of the 22 boilers installed in 1901, (*b*) new switchgear to replace present switchgear installed in 1907, and (*c*) a new 10,000-kW turbo-alternator to replace two of the present turbo-alternators. As this is entirely replacement, and does not increase the capacity of the station, the consent of the Electricity Commissioners is not necessary. The matter will come before the Corporation for approval at the next meeting. It is estimated that the cost of the scheme will be approximately £218,500.

London.—SUBWAYS.—At a meeting of the London County Council, held on June 18th, it was decided to accept the principle of uniting buildings of any description by subway or otherwise to underground or tube railway stations, provided that adequate precautions are taken against fire and panic and that traffic conditions will be alleviated in the neighbourhood. The first application which is to be considered is for a subway connecting the Dominion Theatre with Tottenham Court Road tube station.

Sunderland.—YEAR'S WORKING.—The accounts of the working of the Corporation tramway department (general manager and engineer: Mr. C. A. Hopkins) show a total revenue of £122,442 and working expenditure of £99,256, leaving a gross profit of £23,186. The figures for the preceding year were: Income, £128,899; working expenses, £101,361; gross profit, £27,538. From the gross profit is deducted a debit balance from the motor-omnibus service of £1,922 and an unemployment grant of £131 is added, making a total of £21,395 available. After payment of capital and income tax charges there is a balance of £15,417, which is allocated as follows:—Repayment of loans, £10,078; renewal fund, £5,339. The capital expenditure during the year amounted to £24,984, of which £18,687 was spent on buildings at the Fulwell depôt and £5,845 on permanent way. The number of passengers carried decreased from 30,921,458 to 29,337,273, and the car miles run from 1,701,470 to 1,628,715. The traffic revenue per car mile fell from 18.182d. to 17.7d.

United States.—NEW YORK.—A collision occurred on June 19th between two trains of the elevated railway at a sharp curve opposite the Cathedral of St. John the Divine, 150 ft. above the street level. One train ran into the rear of the other, causing a small fire among the wreckage. One person was killed and several injured.

Telegraph and Telephone Notes.

Brazil.—COMMUNICATION SERVICES.—Despite the great development of the country, it is estimated that there are only 102,362 miles of telegraph wires in operation in Brazil, or only 2.5 miles per 1,000 of the population. The number of telephones in use in Brazil is returned at only 105,209, or only 2.6 per 1,000 inhabitants.

The Brazilian Telephone Company, a Canadian undertaking which operates local telephone service in over 300 cities in the Federal district and the States of Rio de Janeiro, Minas Geraes, Sao Paulo and Parana, has undertaken an extensive construction programme in connection with its local and interurban services. The company now has over 100,000 telephones in its system, and the first multi-office automatic exchange in Brazil was installed in Sao Paulo in July, 1928, and another large one will be ready for service late this year. The programme of extension for the city of Rio de Janeiro contemplates the installation of approximately 30,000 automatic telephones in the next two years. Agreements have also been reached with the competent government authorities whereby the Brazilian Company will install additional automatic exchanges in the towns of Campos, Campinas, Jahu, and Bello Horizonte, State of Minas Gerase, as well as ordinary battery or magneto exchanges in nineteen other towns.

Finland.—NEW RADIO STATION.—It is stated that the Finnish Post and Telegraph Administration has received three offers for the establishment of a new radio station at Helsingfors. They have been submitted by the German Telefunken Gesellschaft, the English Marconi Company and the American Standard Company.

International Telephony.—ENGLAND-ITALY.—The British Postmaster-General announced last week that the Anglo-Italian telephone service (hitherto restricted to Milan, Genoa, and Turin) had been extended in Italy to Rome, Venice, and Bologna. Communication with the latter places will be restricted initially to subscribers in the London telephone area, but will be made available to the provinces as soon as circumstances permit.

Radio at Sea.—SHIP-SHORE TELEPHONY.—Wireless tests are to be begun immediately between the s.s. *Leviathan* and the American Telegraph and Telephone Company's experimental station at Deal, New Jersey, with a view ultimately to establishing a regular telephone service between ships at sea and any home office in the United States. A regular service from the *Leviathan* is contemplated in the autumn.—*Reuter's* (New York).

United States.—FIVE YEARS' TELEPHONE GAIN.—The rapid expansion of the telephone system in the United States is illustrated by figures just published in the report of the Washington Federal Census Bureau. Statistics show that the number of telephones has increased during the past five years by an average of 5.8 per cent. per annum, while the population has increased at the average rate of 1.50 per cent. Thus, the rate of telephone increase has been nearly four times that of the increase of population. Florida, with 103.7 per cent., shows the largest rate of increase over the period, a gain attributable to real estate development between 1922 and 1925; California ranks second with an increase rate of 57.9 per cent., and New York State shows an increase of 45.8 per cent. The total number of telephones in the United States at the close of 1927 was 18,522,767, or one to about every six of population (for comparison, the total number of telephones in this country in December, 1927, was very nearly 1,600,000, or one to every 30 persons). The principal figures in the report are :—

	1922.	1927.	Per cent. increase.
Systems, or lines ...	57,253	60,148	5.1
Miles of single wire	37,265,958	63,836,182	71.3
Number of telephones ...	14,347,395	18,522,767	29.1
Number of exchanges ...	19,260	20,225	5.0
Number of calls ...	24,647,560,860	31,614,172,621	28.3
Investment in plant and equipment	£441,036,600	£709,774,900	60.9
Operating revenue	£133,113,700	£204,714,700	53.8

MERGER LAW.—General Harbord, president of the Radio Corporation, declared at a convention this week that the cable and wireless merger in Great Britain must affect profoundly American trade throughout the world. He deplored the passage of the law forbidding such a merger in the United States, and he urged a modification of the law, so that the United States could preserve for itself its position in the world of communications. He pointed out that the new British system served practically every important port and city in the world.

Radio Notes.

Austria.—GRAZ STATION.—The reason why the official opening of the new station at St. Peter-bei-Graz had to be postponed until June 17th was the damage done by lightning during thunderstorms recently. On June 10th aerials 80 feet from the ground were blown down.

New Zealand.—LICENCE INCREASES.—The New Zealand radio year, which began on April 1st, opened auspiciously, says *World-Radio*, for the drop in the licence numbers did not prove to be so great as it was last year, which fact reflects favourably on the improved service which is being rendered by the Broadcasting Company. The licence totals on April 30th were as follows, the numbers in brackets being the corresponding figures for March 31st :—listeners' 35,880 (44,810), dealers' 652 (1,509), and amateur transmitters' 132 (192). The nationalisation of the Australian stations, their prospective increase in power, and their assurance of better programmes will almost certainly result in greater listening in New Zealand.

A further step in the N.Z.R.B. Company's progressive policy was marked by the official opening of 2YB, New Plymouth, on April 28th. The company has announced its intention of opening relay stations at ten provincial centres so soon as time and funds allow, and they will all be connected to the main stations by land lines.

North Regional Station.—SLAITHWAITE SITE?—There is a probability of the proposed new north of England regional broadcasting station being erected at Pole Moor, Slaithwaite, near Huddersfield. The clerk of the Slaithwaite Urban District Council has met B.B.C. and Post Office officials regarding a proposed underground cable which would serve the suggested station, the site of which is on the edge of the moors in a very elevated position. For some time tests have been carried out on the site, along with similar tests made at Bacup and Milnrow, in Lancashire, and other places. If erected, the new station will replace those at present operating at Manchester, Liverpool, Leeds-Bradford, Sheffield and Stoke.

Rumania.—"PIRATES."—The broadcasting administration announces that not only will any unlicensed apparatus be confiscated, but any person who puts up an aerial will also be fined, like the owner, up to £13, or sent to prison for a term not exceeding two years. The new station in Bucarest is to be opened in August.

The Kilohertz.—USE ABANDONED.—It will be remembered that for some time past the term kilohertz (kh.) has been substituted in *World-Radio* for kilocycle (kc.), the reason being that kilohertz is a term indicating a rate of speed, *i.e.*, one thousand cycles per second. Now, however, it has been decided by international consent that, since the expression kilohertz is not in general use, it should be abandoned and frequencies expressed in terms of "kilocycles per second." In common with other nations, the B.B.C. will henceforth conform to this rule, and express its frequencies by the formula "kc./s."

Weather Chart Broadcasting.

In conjunction with the Air Ministry, Wireless Pictures (1928), Ltd., is at present carrying out a very interesting series of experiments. On Tuesdays and Thursdays between 2 p.m. and 2.25 p.m. synoptic weather charts are being broadcast from the Daventry (5XX) station of the British Broadcasting Corporation. Reports upon the reception of the charts from as many different places as possible would be of the greatest value to those who are conducting the test. Any reader who possesses a Fultograph can obtain a supply of prepared paper and envelopes, as well as full particulars of the reports required, by writing to Wireless Pictures (1928), Ltd., Dorland House, 14-16, Regent Street, London, S.W.1. If it is demonstrated that weather charts and forecasts can be sent in a few minutes from a central station to all parts of the country, as well as to airships and aeroplanes in flight, it will be realised that a big step forward has been made in reducing air risks, for pilots will be able to see at a glance the state of the weather in districts towards which they are flying.

Television in Germany.

Inquiries confirm the reports in the Berlin Press that a large and powerful combination has been formed to work the Baird system of television in Germany, says the *Daily Telegraph*. In addition to the English Baird Television Development Co., Ltd., partners in this concern will be: the Zeiss works, which will supply the optical elements of the installations: Bosch Co., Stuttgart, which will make the necessary motors; and the Loewe-Radio Co., which specialises in wireless equipment. This success seems to have been due to the impartial encouragement of the German Government. As a result of a visit to London of Wireless Commissioner Bredow and his chief engineer, Mr. Baird was invited to experiment in Berlin. Trial transmission has been going on there for some time past, and was picked up at the Baird laboratories in Long Acre, London. Apparently it is the intention of the German Government to encourage the development of television.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—July 15th. State Electricity Commission of Victoria. Two 750-kVA transformers and spares. (B.X. 5325.)*

July 23rd. Posts and Telegraphs Department. Telegraph instruments. (B.X. 5323.)*

July 24th. Victorian Railway Commissioners. Electric overhead travelling cranes, spare motors, and trolley wires. (A.X. 8092.)*

SYDNEY.—August 12th. Department of Public Works. Auxiliary hydro-electric generating plant for Burrinjuck. (B.X. 5365.)*

Belgium.—IXELLES, BRUSSELS.—July 5th. Supply of 887, 220 and 444 d.c. ampere-hour and watt-hour meters. Particulars for 6¾ fr. from Service de l'Electricité, 22, Rue d'Alsace-Lorraine, Ixelles.

Carlisle.—July 12th. Electricity Department. Supply, delivery, and erection of switchgear for use in an 11,000-V, 3-phase, 50-cycle sub-station. (June 28th.)

Chile.—VALPARAISO.—July 12th. Ministry of Marine. Two aerial towers for the new wireless station at Arica. (A.X. 8134.)*

SANTIAGO.—August 16th. Departments de Materiales y Almacenes, Chilean State Railways. Materials, including underground cable, train lighting material, lamps, &c. (C. 3069.)*

Croydon.—July 4th. Electricity Department. Supply of 25,000 tons of coal suitable for use on chain grate mechanical stokers. (June 28th.)

Dundee.—July 10th. Electricity Department. One seven-panel e.h.p. compound-filled sub-station switchboard for a 6,600-V, 3-phase, 50-cycle system. (June 28th.)

Edinburgh.—July 8th. Electricity Supply Department. One automatic electric elevator for Portobello power station. Specifications, &c., from Mr. E. Seddon, engineer and manager (£1 1s. deposit).

Egypt.—CAIRO.—July 15th. Ministry of Interior. One 250-kVA Diesel engine-driven a.c. generating set, with switch and control gear. (B.X. 5331.)*

August 15th. Diesel engine alternator for the Zagazig Power Station. (B.X. 5393.)*

August 13th. Supply of an electric power station, with underground and overhead network, for the town of Maghagha. (B.X. 5318.)*

July 13th. Egyptian State Railways. Supply of underground unarmoured, lead-covered, paper-core telephone cable, approximately £E25,000 to £E26,000.

Glasgow.—July 3rd. Corporation. Electric lighting installation at Plantation Baths and Wash-houses. Specifications from office of Public Works, 64, Cochrane Street.

July 4th. Electricity Department. Extension of the overhead charging feeder system, and charging plant at the Govan refuse destructor station garage. Specifications, &c., from the general manager, 75, Waterloo Street, Glasgow, C.2.

Holywood.—July 2nd. Urban District Council. Laying and erection of l.p. underground and overhead mains and h.p. cable, erection of l.p. switchboard, h.p. armour-clad and truck-type switchgear, and 3-phase transformers. (June 14th.)

India.—SIMLA.—July 8th. Indian Stores Department. 30-kW oil engine-driven generating set for the Military Engineering Services, St. Thomas Mount, Madras. (B.X. 5364.)*

July 12th. Three continuous wave wireless transmitting sets, 580 to 3,000 meters. (June 28th.)

Lincoln.—Bracebridge Mental Hospital. Electrical installation for two new villas at Bracebridge, near Lincoln. (See this issue.

London.—CENTRAL ELECTRICITY BOARD.—July 22nd. Supply, delivery and erection of central indicators and telephones for the Central Scotland Electricity Scheme, 1927. (June 7th.)

July 27th. Supply, delivery, and erection of 132,000-V overhead transmission lines for the Mid-East England Electricity Scheme, 1929. (June 28th.)

LONDON COUNTY COUNCIL.—July 8th. 150 complete bodies for tramcars, 150 sets of swing bolster bogie trucks, 150 electrical equipments for tramcars, &c., and 150 magnetic track and wheel brake equipments. (June 7th.)

STEPNEY.—July 4th. Parish Guardians. Installation of two electric lifts, &c., at the South Grove Lodge, and one electric lift at the St. George-in-the-East Hospital. (June 28th.)

METROPOLITAN ASYLUMS BOARD.—July 10th. Supply and fixing of a complete wireless installation at Princess Mary's Hospital, Cliftonville, Margate. (June 28th.)

New Zealand.—WELLINGTON.—Posts and Telegraph Department. July 6th. V.i.r. wire. (B.X. 5411.)* July 9th. Dial cords. (B.X. 5412.)* July 10th. Lead-sheathed, enamelled and cotton core, contractor cable (B.X. 5413.)*

July 3rd. Black adhesive insulating tape. (B.X. 5378.)*

August 7th. Enamelled and silk-covered resistance wire. (B.X. 5392.)*

August 13th. Public Works Department. Water turbine-driven generating sets and switchgear for Waitaki. (B.X. 5278.)*

September 4th. Government Railways. Motor generator. (B.X. 5308.)*

AUCKLAND.—August 19th. Auckland Electric Power Board. Single-phase transformers. (B.X. 5324.)*

South Africa.—PRETORIA.—Posts and Telegraphs Department.

August 1st. Telephone cable. (B.X. 5345.)*

August 8th. Telegraph materials, including iron tubular sidearms, porcelain insulators, paper sleeves, solder and insulating spindles. (A.X. 8112.)*

PIETERSBURG, TRANSVAAL.—August 13th. Municipal Council. Steam-raising plant, engine alternator and switchgear. (A.X. 7983.)* H. and l.p. cable, lamps and sundries. (B.X. 5312.)*

JOHANNESBURG.—August 1st. South African Railways and Harbours. 10-ton electrically-driven overhead travelling crane for Maritzburg workshops. (A.X. 8105.)*

Sunderland.—July 8th. Electricity Department. Paper-insulated, lead-sheathed cable, rubber-insulated wire, meters, gasfilled and vacuum lamps. (June 7th.)

Uruguay.—PORT AUTHORITIES.—July 22nd. 300-kilo electro pneumatic drop-hammer. (A.X. 7974.)*

Wolverhampton.—July 10th. West Midlands Joint Electricity Authority. Three 225,000-lb. boilers with economisers, air heaters, fans, &c. (June 7th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1

Contracts Closed.

Australia. — SYDNEY. — The Civic Commissioners have accepted the tender of Siemens Pty. (Australia), Ltd., for the supply of 145,900 yards of 30,000-V cable, pilot cable, and jointing material, at a cost of £266,083.—*Reuter's* (Sydney).

Aylesbury.—Town Council. Accepted:—
15 transformers (£477).—English Electric Co., Ltd.

Barnes.—Urban Council. Accepted:—
Cables in connection with the bulk supply.—Hackbridge Cable Co., Ltd., and the Greenwich Cable Works, Ltd.

Basingstoke.—Town Council. Accepted:—
500-kW motor-generator set (£2,178).—British Thomson-Houston Co., Ltd.

Bedford.—Electricity Committee. Recommended:—
Battery extension (£339).—Chloride Electrical Storage Co., Ltd.

Brighton.—Lighting Committee. Accepted:—
Acid neutraliser (£185).—Tudor Accumulator Co., Ltd.
Four automatic coal weighers (£680).—W. & T. Avery, Ltd.

Croydon.—Electricity Committee. Recommended:—
Two kVA transformer kiosks.—Metropolitan-Vickers Electrical Co., Ltd.
One 100-kVA transformer (£112), one 250-kVA ditto (£180).—British Electric Transformer Co., Ltd.
Two sets of oil-immersed fuses (£190), one armour-clad switch (£193).—A. Reyrolle & Co., Ltd.

Dundee.—The Corporation Electricity Committee last week considered tenders for the supply of cable from British, Belgian and Dutch firms. Without discussion the committee accepted the offers for Belgian and Dutch cable, these being about 19 per cent. lower than the British quotations.

Grimsby.—Electricity Committee. Recommended:
Boiler feed pump (£344).—Rees Roturbo, Ltd.
Runaway for coal plant (£860).—Herbert Morris, Ltd.

Government Contracts.—The following Government contracts were placed during May, 1929:—

ADMIRALTY (CONTRACT AND PURCHASE DEPARTMENT).

Aluminium ingots, sheets and sections.—British Aluminium Co., Ltd.
Controlling boards, &c.—Whipp & Bourne, Ltd.; H. W. Sullivan, Ltd.
Electric cable.—Anchor Cable Co., Ltd.; British Insulated Cables, Ltd.; Craigpark Electric Cable Co., Ltd.; Edison Swan Cables, Ltd.; Enfield Cable Works, Ltd.; General Electric Co., Ltd.; W. T. Glover & Co., Ltd.; Hackbridge Cable Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Hooper's Telegraph and India Rubber Works, Ltd.; India Rubber, G.P. and Telegraph Works Co., Ltd.; Johnson & Phillips, Ltd.; Macintosh Cable Co., Ltd.; St. Helens Cable & Rubber Co., Ltd.; Siemens Bros. & Co., Ltd.
Cells.—Fuller Accumulator Co., Ltd.; D.P. Battery Co., Ltd.
Engine room fans.—Electro-Dynamic Construction Co., Ltd.
Motor generators.—Haslam & Newton, Ltd.
Magnetic keys, &c.—Veritys, Ltd.
W/T transformers.—Ferranti, Ltd.; W. H. Wilson; Foster Engineering Co., Ltd.
W/T transmitters, panels, &c.—Gambrell Bros, Ltd.; H. W. Sullivan, Ltd.
W/t tuners and amplifiers.—H. W. Sullivan, Ltd.; Plessey Co., Ltd.; Radio Instruments, Ltd.
W/T valves.—General Electric Co., Ltd.; Mullard Radio Valve Co., Ltd.

WAR OFFICE.

Electric cable.—W. T. Henley's Telegraph Works Co., Ltd.

POST OFFICE.

Manufacture, supply, drawing-in and jointing cable.—Guildford-Basingstoke-Reading: Johnson & Phillips, Ltd.; London-Leatherhead: Siemens Bros. & Co., Ltd.
Distribution switchboard, Rugby Radio Station.—Ferguson, Pailin, Ltd.
Electric goods lift, Metropolitan Automatic Exchange.—Keighley Electrical Engineering Co., Ltd.
Telephone exchange equipment.—East London Rubber Co. (E.C.2): Relay Automatic Telephone Co., Ltd.; Grimsby: Siemens Bros. & Co., Ltd. Crosby (Liverpool) and Jesmond: Standard Telephones & Cables, Ltd.; Hampstead: Ericsson Telephones, Ltd.. Subcontractors: Electric Construction Co., Ltd., for motor-generators; Crompton Parkinson, Ltd., for ringing machines; Pritchett & Gold & E.P.S., Co., Ltd., for batteries. Theydon Bois and Midland (Birmingham): Automatic Telephone Mfg. Co., Ltd.
Telephone Repeater Station, Derby, 4-wire repeater equipment.—Standard Telephones & Cables, Ltd.
Telephone apparatus.—Ericsson Telephones, Ltd.; Phœnix Telephone and Electric Works, Ltd.; Standard Telephones and Cables, Ltd.; Telephone Mfg. Co., Ltd.
Wireless apparatus.—Marconi's Wireless Telegraph Co., Ltd.; Standard Telephones & Cables, Ltd.
Testing apparatus.—General Electric Co., Ltd.; E. Turner.
Cable (various).—British Insulated Cables, Ltd.; Callender's Cable & Construction Co., Ltd.; Connolly's (Blackley), Ltd.; General Electric Co., Ltd.; W. T. Glover & Co., Ltd.; Hackbridge Cable Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Pirelli-General Cable Works, Ltd.; Siemens Bros. & Co., Ltd.
Joint box castings.—Bradley & Turton, Ltd.; General Foundry & Engineering Co., Ltd.; Planet Foundry Co., Ltd.; United Steel Companies, Ltd. (Thos. Butlin and Co. Branch).
Electric clocks.—Magneta Time Co., Ltd.
Cords for telephones.—International Electric Co., Ltd.; Phœnix Telephone & Electric Works, Ltd.; Reliance Electrical Wire Co.; Siemens Bros. & Co., Ltd.; Standard Telephones & Cables, Ltd.
Ducts.—J. Place & Sons, Ltd.
Dynamotors.—W. Jones & Co.
Electric light fittings.—Siemens Electric Lamps & Supplies, Ltd.
Electric hand lamps.—Revo Electric Co., Ltd.
Telegraphic ironwork.—Bayliss, Jones & Bayliss, Ltd.; Bullers, Ltd.; T. W. Lench, Ltd.; C. Richards and Sons, Ltd.; D. Willetts, Ltd.
Electric lamps.—Edison Swan Electric Co., Ltd.; General Electric Co., Ltd.
Motor-generator sets.—Bull Motors, Ltd.
Jointing sleeves.—Dugard Bros., Ltd.; C. M. Powell Bros.
Bronze wire.—F. Smith & Co., Ltd.; Whitecross Co., Ltd.
Insulated bronze wire.—British Insulated Cables, Ltd.; Siemens Bros. & Co., Ltd.
Copper wire.—Edison Swan Cables, Ltd.; E. & E. Kaye, Ltd.; Nevill Druce & Co., Ltd.; Pirelli-General Cable Works, Ltd.; Whitecross Co., Ltd.
Cadmium copper wire.—British Insulated Cables, Ltd.; F. Smith & Co., Ltd.; Whitecross Co., Ltd.
G.I. wire.—W. Bain & Co., Ltd.; Shropshire Iron Co., Ltd.; Whitecross Co., Ltd.

CROWN AGENTS FOR THE COLONIES.

Cable.—St. Helens Cable & Rubber Co., Ltd.
Cable and boxes.—W. T. Henley's Telegraph Works Co., Ltd.
Coal handling plant.—Mitchell Conveyor & Transporter Co., Ltd.
Electric lamps.—General Electric Co., Ltd.
Insulators.—Bullers, Ltd.
Meters.—Ferranti, Ltd.
Switchboard.—Switchgear & Cowans, Ltd.
Switchgear.—Electric Control, Ltd.; Ferguson, Pailin, Ltd.
Telephones.—Ericsson Telephones, Ltd.
Telephone cable.—British Insulated Cables, Ltd.; Siemens Bros. & Co., Ltd.; Callender's Cable & Construction Co., Ltd.
Train lighting equipment.—J. Stone & Co., Ltd.
Wire.—Whitecross Co., Ltd.; Elliott's Metal Co., Ltd.; F. Smith & Co., Ltd.

H.M. OFFICE OF WORKS.

Wiring Permanent Buildings, Belfast.—T. Clarke & Co., Ltd.
12 months' supply of electric lamps.—Metro-Vick Supplies, Ltd.

Ironbridge.—West Midlands Joint Electricity Authority. Accepted:—
Complete electrical generating plant for the first section of the Ironbridge power station:
One 50,000-kW turbo-alternator, transformers, and the necessary auxiliary equipment.—British Thomson-Houston Co., Ltd.
Condensing plant.—Hick, Hargreaves & Co., Ltd.
Feed pump.—G. & J. Weir, Ltd.
Three circulating water pumps.—Drysdale & Co., Ltd.
Further reference to this contract is made in our "Business Notes" to-day.

London.—HAMMERSMITH.—Electricity Committee.
Four 1,000-kVA and one 50-kVA transformers (£1,795).—British Electric Transformer Co., Ltd.
Two 500-kVA transformers (£456).—Hackbridge Electric Construction Co., Ltd.

WAR OFFICE.

12 months' supply of electric fans.—Metro-Vick Supplies.

METROPOLITAN ASYLUMS BOARD.—The undermentioned tenders were received for:

Installation of two electric lifts at Colindale Hospital:—

E. A. Foulds	£900
Titan Lift Co., Ltd.	960
Glasgow Engineers, Ltd.	1,079
J. Bennie, Ltd.	1,096
Medway's Safety Lift Co., Ltd.	1,180
W. Wadsworth & Sons, Ltd.	1,210
Express Lift Co., Ltd.	1,322
Pickerings, Ltd.	1,364
R. A. Evans, Ltd.	1,400
Waygood-Otis, Ltd.	1,430
Smith, Major & Stevens, Ltd.	1,675

Installation of fire-alarm system at High Wood Hospital for Children:—

Carr Bros.	£248
Telephone & Electrical Maintenance Co.	290
L. G. Tate & Co., Ltd.	315
H. Lewis & Co.	344
Alpha Manufacturing & Electrical Co., Ltd.	384
S. Reed & Sons	420

BATTERSEA.—Electricity Committee. Recommended:—
500-kVA transformer for Chatham House sub-station (£297).—British Electric Transformer Co., Ltd.
H.p. switchgear (£408).—A. Reyrolle & Co., Ltd.
L.p. switchgear (£244 and £322).—General Electric Co., Ltd.
Kiosk, transformer and switchgear for Battersea Park area (£337).—Ferguson, Pailin, Ltd.
Feeder panel for sub-station at Albert Bridge flour mills (£95).—Bertram Thomas.
Three feeder pillars (£290).—Callender's Cable & Construction Co., Ltd.
Pipework at power station (£1,495).—Babcock & Wilcox, Ltd.

LONDON COUNTY COUNCIL.—Electrical work at extension of School of Art, Hammersmith :—

ALPHA MANUFACTURING & ELECTRICAL CO., LTD. (Accepted.)	£1,585
Smethurst & Co. (London), Ltd.	1,660
Stegman & Co.	1,695
H. J. Cash & Co., Ltd.	1,795
Electrical Installations, Ltd.	1,799
J. Briggs, Ltd.	1,841
A. Hawkins & Sons	1,998
Burdett & Co., Ltd.	2,000
A. Dean & Co., Ltd.	2,050
Berkeley Electrical Engineering Co., Ltd.	2,073
Pinching & Walton	2,220

Electric lighting installation at Marvel's Lane School, Lewisham :—

J. BRIGGS, ELECTRICAL CONTRACTORS, LTD. (Recommended.)	£365
Malcolm & Allan (London), Ltd.	369
A. Dean & Co., Ltd.	371
Stegman & Co.	375
Electrical Installations, Ltd.	386
H. J. Cash & Co., Ltd.	419

Stirling.—County Council. Accepted :—
Wiring contract in connection with the housing scheme.—J. & J. Duff.

Forthcoming Events.

Electrical Contractors' Association.—June 26th to 28th. Bournemouth. Annual Conference.

Institution of Mechanical Engineers.—June 25th-28th. Manchester. Summer Meeting.

Physical Society.—Friday, June 28th. Imperial College of Science, South Kensington, S.W. 5 p.m. Ordinary meeting. Visit to Avonmouth Docks, Bristol.

North-East Coast Institution of Engineers and Shipbuilders.—July 2nd-4th. Summer meeting, Newcastle-on-Tyne.

Tramways and Light Railways Association.—Wednesday, July 3rd. Sheffield Annual Congress.

Institution of Electrical Engineers.—Thursday, July 4th. Annual conversazione at the Natural History Museum, South Kensington, S.W.

(South-Midland Centre).—Tuesday, July 2nd. Summer meeting. Visit to Avonmouth Docks.

Overhead Lines Association.—Friday, July 5th. Summer meeting. Charabanc tour in the Mid-Cheshire area.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names of suppliers of the following :—

"DRENCO" electric iron.

GRANVILLE motors or starters.

Notes.

Very-high-pressure Steam Plant.

In 1923 the Compagnie des Centrales Electriques en Flandres ordered from the Brown-Boveri Co. a 1,700-kW turbine designed to work with steam at an absolute pressure of 725 lb. per sq. in., 442 deg. C., the highest steam pressure employed in Europe up to that time. The results given by the set proved so satisfactory that in 1927 an order was placed with the same company for a second turbine to work with steam at the same pressure and temperature, but having normal and maximum capacities of 6,600 and 8,000 kW. The two turbines work with a back-pressure of about 370 lb. per sq. in., the exhaust steam being employed to run the older condensation-type turbines. To meet the requirements of the new turbines, the boiler installation was altered from 327 lb. per sq. in. pressure and 325 deg. C. temperature to 810 lb. and 450 deg. C. It became necessary last year to arrange for a further extension of the generating plant, and an order was placed with the same manufacturers for a turbine capable of developing from 20,000 to 25,000 kW and of working with steam at 725 lb. and 442 deg. C. The turbine, which is the largest to be so far constructed for so high a working pressure, is of the three-cylinder type, and is designed to run at 3,000 r.p.m. Special attention has been devoted in the design to meet the particular requirements, especially in the low-pressure section of the machine. The difference in the temperature in each stage is very small, reaching only 150 deg. C. in the high-pressure section.

The shaft of the high-pressure rotor is rigidly coupled to that of the medium-pressure section, while the rotors of the medium- and low-pressure sections are connected by semi-flexible couplings. The fixed connection between the two first stages is provided with a thrust bearing, the two casings being thus free to expand separately without any strain on each other. The various component parts are all so designed as to secure uniform heating. The rotating portion of the high-pressure stage comprises a wheel with two crowns with impulse and reaction blades. The steam-distribution system is of the Brown-Boveri standard type. For the maximum economic output of 20,000 kW, steam is admitted above the impulse wheel which works with total injection at that power. For higher outputs steam is admitted below the action wheel directly to the reaction blades. The low-pressure section comprises two graduated rotors, each half rotor embracing five disks with one or two crowns of reaction blades. As there is no intermediate re-heating of the steam, the later stages of operation in the low-pressure section are associated with very wet steam, to deal with which a special condensed-water exhausting device is fitted. Below the third disk of each half rotor is a canal in which water, by centrifugal action, is collected and thence transferred with the steam used for heating purposes to the feed-water heater. The turbine is directly coupled to a 25,000-kW, 12,000-V, three-phase generator which operates at a power factor of 0.80. The overall length of the set is nearly 50 ft., and as it had to be installed in a room only 60 ft. in width, the exciter and the air-cooling fan had to be mounted above the alternator and separately driven by a small auxiliary turbine.

As a result of the high-pressure-steam working, it is claimed that the Langebrugge plant is now converting into electrical energy 23 per cent. of the calorific energy of coal consumed, against only 14 per cent. in the case of generating stations working at a pressure of 284 lb. per sq. in. The chief engineer of the station, Mr. Herry, is, however, still seeking to make further progress, work being now in hand on the installation of a Benson boiler designed to produce 100 tons of steam per hour at a pressure of 3,200 lb. per sq. in.

B.S.S. for Indicating and Recording Instruments.

Revisions of British Standard Specifications Nos. 89 and 90, dealing with indicating instruments and graphic (recording or chart-recording) instruments, respectively, have recently been issued. The technical requirements of these new specifications are similar to those of the previous editions, with the important exception, however, of the clauses dealing with the marking of the instruments and the issue of test certificates. In the past, difficulties have been experienced in connection with the provision of the independent test certificate required under the conditions governing the use of the British standard mark "BeSa," and in order to facilitate matters a report is now called for in place of the certificate originally required. The substitution of the report for the certificate arises from the fact that "certificates" issued by the National Physical Laboratory have acquired a special significance of their own in the eyes of the public, as something in the nature of a guarantee that the article concerned is a satisfactory one, quite independently of the British standard specification covering the article submitted for test. What is often required, however, is a plain statement from the testing authority to the effect that the article submitted—in this case the instrument submitted—conforms in certain respects to the appropriate British standard specification. Such a statement is now provided as a report, and the information to be furnished in the report is clearly stated in the specification. The significance of the use of the British standard mark "BeSa" on an instrument is also clearly defined in the new specifications, copies of which (Nos. 89-1929 and 90-1929) may be obtained, price 2s. 2d. each, post free, from the Publication Department, British Engineering Standards Association, 28, Victoria Street, S.W.1.

Electrical Slogans.

The slogan "Investigate Electric Heat," won the first prize of $250 in the recent industrial electric heat contest conducted by the Joint Committee on Electric Furnace Development of the National Electrical Manufacturers' Association and the National Electric Light Association. It was submitted by Mr. W. H. Steinhauer, of the Toledo Edison Company. The returns in the contest numbered approximately 800, and evidenced wide interest in the subject of industrial electric heat. Submissions were judged by a committee of three judges —Messrs. R. T. Kaighin, G. W. Tall, Jun., and F. M. Feiker, representing the National Electric Light Association, the National Electrical Manufacturers' Association, and the Society for Electrical Development, respectively. The second prize of $100 was awarded to Mr. C. H. Pfingsthorn for "Switch to Perfection with Electric Heat." "Electric Heat is Cheaper than Rejects" won the third prize of $50, and was submitted by Mr. E. A. Heath. Four other prizes, each of $25, were awarded for: "Use Electric Heat if You Want to Compete"; "Heat Electrically—It Makes Good Products Better"; "Electric Heat—the Production Heat with Laboratory Precision"; and "Safeguard Quality and Lower Costs with Electric Heat."

Appointments Vacant.

Electrical engineer (£400) for Dumfries County Council. Two charge engineers for the Lancashire Electric Power Co. Assistant lecturer in electrical engineering at Bradford Technical College. Lady canvasser-demonstrator for Preston Corporation. Assistant experimental officer for Government experimental establishment, Biggin Hill, Kent. Lady demonstrator of electric cooking and other appliances for the Cheltenham Corporation Electricity Department. (See our advertisement pages to-day.)

Register of Light-Treatment Practitioners.

The Society of Apothecaries of London, at the suggestion of the British Medical Association, has formed a permanent scientific committee with regard to violet rays, radiation, and so forth, and is preparing a register of those practising light-treatment, so that the public may be protected and safeguarded in securing treatment by fully qualified people.

Educational.

MANCHESTER MUNICIPAL COLLEGE OF TECHNOLOGY.—Prospectus of degree courses in technology, which include electrical and mechanical engineering and applied chemistry, can be obtained from the Registrar. (See our advertisement pages to-day.)

Institute of Transport.

Sir Josiah Stamp has accepted the office of President of the Institute of Transport in succession to Air Vice-Marshal Sir Sefton Brancker, whose year of office expires on September 30th. Other officers elected by the Council to take office on October 1st, 1929, were: Vice-presidents, Mr. A. L. Barber, Mr. R. Bell, Mr. S. E. Garcke, Mr. R. J. Howley, Sir Alfred Read, and Mr. H. A. Watson. Past presidents to serve on the Council, Sir Lynden Macassey, Sir Joseph Nall, Mr. R. H. Selbie, Mr. Roger T. Smith, and Air Vice-Marshal Sir Sefton Brancker. Honorary treasurer, Sir Henry Maybury. Honorary librarian, Mr. G. Ellson.

Institution of Mining Engineers.

For the general meeting of the Institution at Nottingham from July 10th to 12th an attractive programme of works visits, excursions, and social functions has been arranged. Amongst the papers to be read will be one by Dr. T. F. Wall on the "Electro-magnetic Testing of Wire Ropes."

N.E. England Electricity Scheme.

The Central Electricity Board has published the North-East England Electricity Scheme, which deals with a North-East Coast area of 5,050 sq. miles and will involve the gradual change-over of an extensive 40-cycle system to 3-phase 50 cycles. The scheme is the sixth of the series prepared by the Electricity Commission, and will be outlined in our next issue.

The Clyde "Grid" Crossing.

The River Clyde was closed to traffic for four hours on June 15th at Renfrew when cables were slung across, and crowds of spectators watched the linking up of the tall steel towers on the river banks which carry the 132-kV "grid" across the river.

The Physical Society.

At a meeting held on June 28th, a demonstration of some contact devices used with apparatus for the measurement of electrical resistance at high temperatures was given by Mr. J. L. Haughton, D.Sc., of the National Physical Laboratory.

A paper entitled "The Relation between Hydrogen Pressure and Filament Resistance in a Tube containing Glowing Tungsten" was submitted by Teresa J. Dillon, B.Sc., Ph.D., London School of Medicine for Women, who explained that when the filament is caused to glow, the gas rapidly disappears while the resistance of the filament rises progressively. The latter phenomenon can be used to measure the pressure of the hydrogen, and it was suggested that chemical action took place between the hydrogen and tungsten.

A paper entitled "The Absolute Measurement of Sound Intensity" was read by Mr. F. D. Smith, M.Sc., Admiralty Research Laboratory, Teddington. Sound pressure is received with a moving-coil receiver; the signal heard after suitable amplification is compared with the signal produced by a small known electromotive force e applied to the receiver and when the two signals are equal in intensity the following simple relation connects the total sound pressure P on the receiver with the electromotive force $P = eHl/Z_m$, where H is the strength of the magnetic field in which the moving coil, consisting of a length l of wire, moves, and Z_m is the motional impedance of the receiver at the frequency of the sound. The phase also of the sound can be determined with the aid of a phase-shifting transformer. Since the measurement is independent of the amplifying circuit, it is possible to use a high degree of amplification and very feeble sounds may therefore be measured.

The Heavy Oil Engine.

In our account of the discussion on Mr. G. Porter's paper on the above subject, which was read at the I.M.E.A. Convention, Mr. B. Kelly (Douglas, Isle of Man) was wrongly reported (June 21st issue, p. 1121). What he actually said, *inter alia*, was that their fuel figure, using 0.92 furnace oil costing 75s. per ton, worked out at 0.287d. per kWh generated. He mentioned later that they had now arrived at the state when they required units of from one to three thousand kW capacity, and were therefore putting down steam plant.

Electro-Farming.

In a paper presented to the Fourth International Congress on Rationalisation on "Electro-farming Economics," Mr. R. Borlase Matthews pointed out that electro-farming now had a definite status and a significant influence on the control and elimination of waste and the unnecessary costs of the present agricultural system. For instance, in nearly three hundred different ways labour could be saved by the use of electricity and a reduction in cost effected because electro-farming methods meant increased production. Thus the farmer gained a two-fold advantage, and the fact that he was enabled to increase his production would ensure abundant employment for the agricultural worker. The latter, freed by electric motors from such distasteful tasks as liquid-manure pumping, would be free for other work. Until intensive cultivation became the universal practice, there would be no need to worry about the displacement of man labour by electricity.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Mr. J. WILLIAMS, technical assistant to the city electrical engineer, Salford, has been appointed technical assistant to the engineer, South-East England, Central Electricity Board. Mr. Williams was for many years on the staff of the Yorkshire Electric Power Co., and held successively the positions of assistant engineer in the Operation Department and superintendent of the Testing Department. On the occasion of his departure from Salford, Mr. Romero (city electrical engineer), on behalf of the staff, presented Mr. Williams with a sectional bookcase; a presentation of a camera was also made by Mr. Bunting on behalf of the members of Mr. Williams's department.

Mr. T. E. EACHUS, of St. Albans, superintendent of the Northern area of the North Metropolitan Electric Power Supply Co., who is leaving to become managing director of the Young Battery Co., Ltd., of South London, was on June 18th presented by the staff at St. Albans with a card table and an album containing the names of the subscribers from the company's undertakings at Harpenden, Hertford, Royston, Stevenage, and Welwyn, and the Overhead Line Department. Mr. Eachus has been with the company for 24 years, 21 of which he has spent at St. Albans.

Prof. RICHARD STANFIELD, M.Inst.C.E., M.I.Mech.E., &c., retires at the end of this session from the professorial chair which he has so successfully held for 40 years at Heriot-Watt College, Edinburgh. A committee has been formed to follow up the desire that has been widely expressed that the occasion should not be allowed to pass without some demonstration being made to the Professor of the high esteem in which he is held by thousands of students and others who have benefited from his instruction and friendship at the College. These and other admirers are invited to send subscriptions to the Hon. Treasurer, Mr. Wm. Watson, M.A., B.Sc., Heriot-Watt College, Edinburgh, as early as possible, and not later than September 15th. The presentation will take place in October, but its exact nature will be decided later in consultation with Prof. Stanfield. The joint hon. secretaries, Messrs. W. F. Oliver and A. Neilson, are anxious to be brought into touch with former students whom they cannot trace.

The marriage took place at Areley Kings Church, on June 10th, of Mr. PERCY NEALE MURDOCK, A.M.I.E.E., of Kingstown, Ireland, and Miss CHRISTABEL ELIZABETH TURNER, of Stourport.

The Basingstoke Town Council has granted an honorarium of £75 to the borough electrical engineer, Mr. SWARBRICK, and one of £40 to Mr. CASTLE, for additional services in connection with extensions in the rural area.

The Times reports that the King of Italy has conferred the hereditary title of Marchese on Senatore MARCONI.

The Pretoria Town Council has appointed Mr. L. L. HORRELL electrical engineer and manager of its electricity

department at a salary of £1,200-£1,375 per annum. Mr. Horrell has been connected with the department as assistant electrical engineer for the last 20 years. Before going to South Africa, as may be remembered, Mr. Horrell was on the staffs of the Bedford, Coventry, and Walsall electricity undertakings. His early mechanical training was gained at the old Great Northern Railway works at Peterborough.

The Southend-on-Sea Town Council has granted the borough electrical engineer, Mr. R. BIRKETT, a further three months' leave of absence owing to the condition of his health.

The Marconi International Marine Communication Co., Ltd., announces that Major BASIL BINYON, O.B.E., has been appointed a director of the company, and that the following rearrangement of duties of its higher officials will be effective from July 1st:—Mr. J. Lewis, personal assistant to Mr. F. S. Hayburn, deputy managing director; Messrs. A. R. Harding and R. Ferguson, joint general managers; Mr. J. A. Carswell, general manager for the North; Commander J. A. Slee, manager marine electrical equipments; Mr. W. Platt, manager, B.W.M.S. (vice Mr. R. Ferguson); Mr. J. Connell, deputy manager, B.W.M.S.; and Mr. B. Newton, contract manager (vice Mr. A. R. Harding).

The borough electrical engineer has informed the Brighton Electricity Committee that he has appointed Messrs. P. H. PEAKE and G. A. ROBERTS as sub-station attendants at the Southwick power station; that Mr. ANDERSON, one of the existing sub-station attendants, has obtained another appointment, and that he has appointed Mr. L. BROWN to fill the post.

The Bangor (Northern Ireland) Town Council has appointed Mr. R. S. IRWIN, of the Clones Electricity Co., as manager and engineer of the Bangor electricity scheme, at a commencing salary of £350.

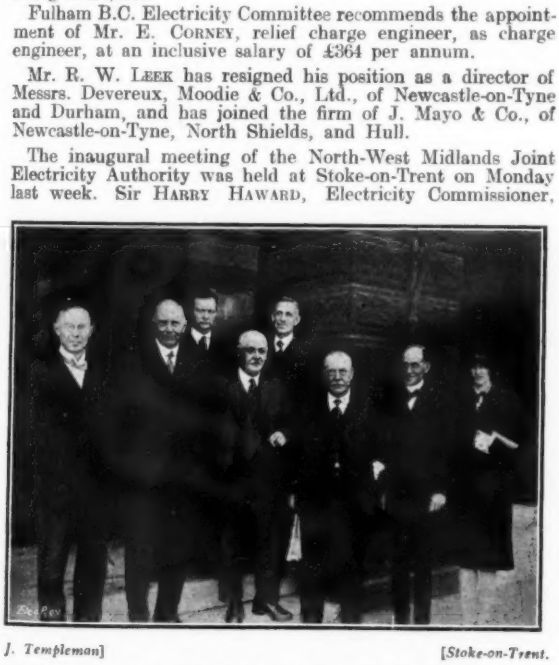
On the occasion of his leaving Odhams Press, Ltd., to join Edison Storage Batteries, Ltd., as assistant manager, Mr. W. E. WARRILOW, A.M.I.E.E., was presented with a cut glass vase and a silver salver bearing the signatures of his colleagues in the advertisement department.

A Manchester paper reports that Mr. W. S. JOHNSTON, manager of Dumfries electricity works, has been appointed manager of St. Helens electricity works at a salary of £800, rising to £1,000.

Fulham B.C. Electricity Committee recommends the appointment of Mr. E. CORNEY, relief charge engineer, as charge engineer, at an inclusive salary of £364 per annum.

Mr. R. W. LEEK has resigned his position as a director of Messrs. Devereux, Moodie & Co., Ltd., of Newcastle-on-Tyne and Durham, and has joined the firm of J. Mayo & Co., of Newcastle-on-Tyne, North Shields, and Hull.

The inaugural meeting of the North-West Midlands Joint Electricity Authority was held at Stoke-on-Trent on Monday last week. Sir HARRY HAWARD, Electricity Commissioner,



J. Templeman] *[Stoke-on-Trent.*

Stoke-on-Trent Officials at the N.W. Midlands J. E. A. Meeting.

outlined the objects of the new authority. Alderman H. LEESE (Stoke) was appointed chairman and Mr. W. A. FURMSTON (Leek Urban District Council) vice-chairman. A photograph of the Stoke officials taken after the meeting is reproduced herewith. The group includes Ald. Leese, Ald. G. Hassall, Ald. S. Sproston, Mr. J. Kent, Mr. C. H. Yeaman (chief electrical engineer of the Stoke-on-Trent undertaking), and Mrs. Yeaman.

Obituary.—MR. H. J. S. MACKAY.—Many people in the electrical industry will learn with regret of the death on June 19th of Mr. Henry John Sutherland Mackay, managing director of the Stirling Boiler Co., Ltd., at the age of 57. Mr. Mackay was educated at Glasgow University and the Technical High School, and served his apprenticeship with Messrs. Alex. Chaplin & Co., Govan. He also spent a term with Messrs. D & W. Henderson. From 1897 until the following year he was chief engineer in charge to Messrs. McLeay & McIntyre. He then went to the National Boiler & General Insurance Co., Ltd., as inspecting engineer, later becoming assistant chief engineer. He joined the Stirling Boiler Co. in 1902 as an engineer and became successively London manager and

The late Mr. H. J. S. Mackay.

Managing Director of the Stirling Boiler Co., Ltd.

general manager. He was appointed managing director of the company in 1916, and held that position at the time of his death. Mr. Mackay was a member of the Institutions of Mechanical Engineers and Marine Engineers, and an associate member of the Institute of Naval Architects. The funeral took place on Saturday last. A portrait of Mr. Mackay is reproduced herewith.

MR. R. MARSHALL.—The death has occurred in Kent of Mr. Roland Marshall, who was for 20 years chief electrical engineer to the Ayr Corporation. He was appointed in 1903 and retired on pension in 1923 when the Ayr electricity undertaking was taken over by the Ayrshire Electricity Board. Before his appointment to Ayr he was in the service of Mr. Robert Hammond, who, as consulting engineer, was responsible for the laying down of the Ayr station, and he took part in that work. During his 20 years' service with the Corporation Mr. Marshall was responsible for important additions to generating plant and extensions of mains. Latterly he was actively concerned on the project for making use of the water power of Loch Doon for the Ayr supply, and spent a great deal of time in working out details for the promotion of the scheme. It was a matter of great regret to him when the Town Council abandoned the scheme, relinquishing the powers which it had obtained to the Ayrshire Electricity Board. Mr. Marshall, who was unmarried, was about 56 years of age.

MR. C. W. HILL.—We have to record with feelings of personal regret, in which, we are sure, we shall be joined by many friends in the electrical profession and industry, the death of Mr. Claude W. Hill, A.M.Inst.C.E., M.I.E.E., M.I.Min.E. Mr. Hill was for many years past a well-known consulting engineer, but prior to this he had been connected with the management of many electrical plant manufacturing companies. As consulting engineer he was responsible for various important bridges, saw mills at home and abroad and other important works. He was the author of a well-known book on "Electric Crane Construction" and of another on "Toothed Gearing." He was a valued contributor to the ELECTRICAL REVIEW, his last article being on "Potentiometer Regulators" in our issue of June 7th. The funeral was to take place on Wednesday last at Streatham Park Cemetery.

MR. S. O. ALLEN.—We regret to record the death, in Liverpool, of Mr. Sidney O. Allen, district manager of the North-Western area of the Post Office Telephones.

HERR M. KUBIERSCHKY.—The death recently occurred suddenly in Rio de Janeiro of Herr Martin Kubierschky, the general director of the Mix & Genest Co., of Berlin. The deceased, who was 60 years of age, was visiting South America on behalf of his company, and was a leading authority on automatic telephony.

Will.—Mr. F. B. PELL, Associate I.E.E., of Leigh-on-Sea, left £1,895 gross and £612 net personalty.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

General Installation Co., Ltd.—Private company. Registered June 15th. Capital, £100 in £1 shares. Objects: To carry on business as electrical and general engineers, builders, contractors, &c. The directors are:—F. de C. Grylls, 183, Edgware Road, W.2, merchant; E. L. S. Wolf, B.Sc., 57, Thurleigh Road, S.W.12, engineer. Registered office: 183, Edgware Road, W.2.

Vandervell Electric Reproducing Co., Ltd.—Private company. Registered June 15th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers, erectors, maintainers and repairers of and dealers in all wireless, telegraphic and telephonic apparatus, valves, instruments, equipment and accessories, &c. The subscribers (each with one share) are:—E. H. Wiseman, 8, Severn Avenue, Gidea Park, Romford, Essex, clerk; S. E. Penhallow, 112, Regent Street, W.1, clerk. Solicitors: J. D. Langton & Passmore, 111, Old Broad Street, E.C.

Swift Transports, Ltd.—Private company. Registered June 17th. Capital, £10,000 in £1 shares. Objects: To carry on the business of proprietors of light railways and tramways, trolley vehicle systems, lorries, omnibuses, and motor and other vehicles, &c. The subscribers (each with one share) are:—W. N. Browning and W. H. Lovett, 16, Great George Street, S.W.1, clerk. J. S. Brockley signs as director. Registered office: Staines Road, Hounslow.

Clarith Reproducers, Ltd.—Private company. Registered June 17th. Capital, £2,000 in £1 shares. Objects: To acquire the business now carried on by J. I. Smith and A. E. Clarke at 3, Queen Square, Leeds, as the "Clarith Reproducers," including the registered trade mark "Clarith," and to carry on the business of designers and manufacturers of and dealers in all kinds of apparatus for wireless transmission and reception of both sound and pictures, gramophones, sound recorders, amplifiers and producers, &c. The subscribers (each with one share) are:—A. E. Clarke, 3, Queen Square, Leeds, consulting engineer; J. I. Smith, Swalewell Hall, Pudsey, Yorkshire, gramophone manufacturer. Solicitors: Simpson, Curtis, Dixon and Burrill, Leeds.

Harmonic Radio Co., Ltd.—Private company. Registered June 21st. Capital, £100 in £1 shares. Objects: To carry on the business of wireless engineers, manufacturers of and dealers in radio apparatus, &c. The first directors are:—B. H. J. Kynaston, 172, Trent Boulevard, West Bridgford, radio engineer; J. Kynaston, 172, Trent Boulevard, West Bridgford, cashier. Registered office: 13, Forman's Buildings, Goldsmith Place, Nottingham.

Woodall & Partners (1929), Ltd.—Private company. Registered June 20th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of, agents for, and dealers in all kinds of plant, machinery and electrical equipment, contractors for the installation of all kinds of electrical appliances, &c. The directors are:—E. S. Hare, 47, Port Tennant Road, Swansea; Dorothy Alexander, Tea Tree Cottage, Fetcham, Surrey.

Weinbau Incandescent & Electrical Co., Ltd.—Private company. Registered June 19th. Capital, £10,000 in £1 shares. Objects: To acquire the business of merchants, warehousemen, manufacturers, importers, and exporters of and dealers in incandescent gas light apparatus and fittings, electric lamps and bells, electric meters and switchgear, all kinds of electrical fittings and accessories, and all other appliances appertaining to lighting and heating, formerly carried on by M. Weinbaum at 419-423, Commercial Road, E.1. The permanent directors are:—M. Weinbaum (governing director), and A. H. Weinbaum, both of 56, Amhurst Park, N.16. Registered office: 419, Commercial Road, E.1.

Norcold, Ltd.—Private company. Registered June 24th. Capital, £30,000 in £1 shares. Objects: To adopt an agreement with S. Smith and J. D. Tait, to develop and turn to account all rights now held by them in the "Narco" refrigerating system (U.S.A. and Canadian rights excepted) and the assets comprised in the said agreement, and to carry on the business of manufacturers of, agents for and dealers in refrigerating apparatus and machinery, stoves, heating apparatus, electrical machinery and components, air compressors, household utility apparatus, &c. The directors are:—J. D. Tait, Strand Palace Hotel, Strand, W.C.; J. D. Wilson, 33, Herondale Avenue, S.W.18; S. Smith, 67, Westborough, Scarborough. Secretary: J. D. Tait. Registered office: Bush House, Aldwych, W.C.2.

Associated Electrical Supplies, Ltd.—Private company. Registered in Belfast on June 11th. Capital, £5,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical supplies, apparatus and plant, &c. The directors are:—J. P. Graham and C. J. Graham, Lagan Mills, Dromore, building and engineering contractors. Registered office: Lagan Mills, Dromore, Co. Down.

Official Returns of Electrical Companies.

Triotone, Ltd.—Debenture dated June 7th, 1929, to secure £700, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: E. K. Brown, Lennox House, Norfolk Street, W.C.2.

S. B. Hereford, 41, Wigmore Street, W., was appointed receiver and manager on June 12th, under powers contained in debenture dated June 7th, 1929.

Richmore Valve Co., Ltd.—C. H. Shelvoke, 33, New Hall Street, Birmingham, was appointed receiver on June 7th, 1929, under powers contained in debentures dated October 18th, 1928.

Oldhill Manufacturing Co., Ltd.—Debenture dated June 1st, 1929, to secure £200, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Rebecca Cohen, 22, Lealand Road, Tottenham, N.15.

Flexible Electric Cords, Ltd.—Debenture dated May 30th, 1929, to secure £200, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Mrs. G. A. Riley, The Ridgway, Enfield.

Colne Valley Electric Supply Co., Ltd.—Satisfaction to the extent of £2,325 on May 31st, 1929, of debenture stock secured by trust deeds dated July 4th, 1925, and November 20th, 1926, securing £100,000.

"M.P.A." Wireless, Ltd.—Issue on June 12th, 1929, of £5,370 debentures, part of a series already registered.

Micanite & Insulators Co., Ltd.—Satisfaction in full on May 24th, 1929, of debentures dated March 26th, 1908, and November 20th, 1916, securing £25,000.

James Boardman, Ltd.—Mortgage dated June 3rd, 1929, to secure £500 charged on land and buildings in Blackburn. Holders: H. S. Haworth and P. Haworth, 7, Lord Street West, Blackburn.

Kinetic Co., Ltd. (Old Company).—T. Rimington, 43, Gallowtree Gate, Leicester, ceased to act as receiver or manager on June 8th, 1929.

J. Smith & Son (Brighton), Ltd.—Two mortgages, dated June 3rd, 1929, to secure £2,500 and £5,000, respectively, charged on the company's undertaking and property, including uncalled capital. Holders: Mrs. M. A. Smith, 21, Windlesham Gardens, Brighton; and J. D. Smith, Hills Down, Heath Road, Haywards Heath.

Robinson & Rex, Ltd.—Debenture dated May 25th, 1929, to secure all sums not exceeding £400 for which the chargee may become liable by virtue of his guarantee to Barclay's Bank, Ltd., charged on the company's undertaking and property, present and future, including uncalled capital. Holder: R. J. Mott, 12, York Buildings, Adelphi, W.C.

Eddystone Components, Ltd.—Satisfaction in full on April 14th, 1928, of second mortgage debenture dated June 30th, 1927, securing £1,000. (Notice filed June 18th, 1929.)

"K.N." Electrical Products, Ltd.—Debenture dated May 31st, 1929, to secure £1,000 charged on the company's property and assets, present and future, including uncalled capital. Holder: P. Ferguson, "The Garth," Grange Road, Highgate, N.6.

Electro-Dynamic Construction Co., Ltd.—Memorandum of deposit on June 10th, 1929, to secure all moneys due or to become due from the company to Barclays Bank, Ltd., charged on lease of premises in rear of 733b, Old Kent Road, S.E.

City Notes.

Electric Supply Corporation, Ltd.

The annual meeting was held on June 17th, Mr. J. G. B. Stone (chairman) presiding. In presenting the report and accounts (ELEC. REV., June 14th, p. 1066), the chairman said that the lamp connections showed an increase of 7 per cent., and the electrical energy sold for all purposes increased by 5¼ per cent. to over 11¼ million kWh, the demand for domestic power and heating showing an increase of 12 per cent. Gross earnings were practically stationary because of reductions in charges to consumers. Reviewing the position of the subsidiary companies, the chairman said that the sale of the Dollar and Jedburgh undertakings was made at satisfactory figures, and the whole of the share capital of the Steyning Electric Light Co., Ltd., had been purchased. The Steyning Company had applied for an extension of its area which would join up with Hassocks on one side and would extend its field of operations to Pulborough. The Alton Company had applied for an extension of its area to cover the whole of the Alton rural district, and the Petersfield Company had applied for the whole of the Petersfield rural district and a small portion of Midhurst rural district. If those applications were successful the associated companies would have control of electricity supply over a large and compact area in Central Sussex. In this area there was the Burgess Hill undertaking, owned by another company, which they had arranged to supply in bulk. The Central Sussex Electricity, Ltd., had also applied for an extension of the Haywards Heath area. The supply of electricity in the area of the Uckfield Act and in that of the Hassocks and Hurstpierpoint Order had been deferred as a result of the passing of the Electricity Act of 1926, pending the adoption of a scheme for the district by the Central Electricity Board. The progress of the Haywards Heath undertaking had been hampered for the same reason. After considerable negotiations, through the good offices of the Central Electricity Board, the company had been able to secure a supply of electricity in bulk somewhat earlier than it would otherwise have been available under their scheme. It was hoped that that supply would be delivered at Hurstpierpoint by the end of the year, and the company had undertaken to distribute it from there throughout the area in question. A bulk supply from Portsmouth to Petersfield had not yet been obtained, but it was hoped that it would be available shortly, when it was proposed to change over the present system of supply. New plant had been installed at Alton and Newhaven. A Special Order was being promoted for the transfer of the Exmouth undertaking to a local company in exchange for shares in that company. When those shares had been obtained, it had been agreed to dispose of them and those of the Wellington Company on satisfactory terms. There had been considerable delay in the construction of the power station at Peterhead, but it was now nearly completed, and the machinery was in course of erection. The report and accounts were adopted.

United River Plate Telephone Co., Ltd.

The annual meeting of this company was held on June 18th. Mr. H. M. Pease (deputy chairman) who presided, in submitting the report and accounts (*vide* ELEC. REV., June 21st, p. 1114) referred to the offer of the purchase of the holdings of the ordinary shareholders by the International Telephone and Telegraph Corporation of New York, which offer was accepted by the majority of shareholders. It was the wish of the Corporation that all the original directors should remain on the board, but while this could not be arranged they were glad that Mr. Kingsbury, Mr. Anns and Mr. Howard-Williams were able to continue to act. The company had continued to make fair progress, but the accounts had been adversely affected by the cancellation in October last of the increase in tariffs granted in October, 1922, without the company being heard. Another difficulty had been a serious strike which took place in Rosario last July, which resulted in considerable loss before a settlement was arranged, and later in the year they were threatened with a strike in Buenos Ayres, and an arrangement was not come to with the men until early in March. This arrangement would entail a considerable increase in the working expenditure, and they were looking to the Argentine Government to sanction adjustments of the tariffs, so as to enable the company to earn a reasonable return. The total capital expenditure during the year amounted to £1,096,757, which included £754,084 for new exchanges and extensions of the system. The number of stations had increased during the year by 16,684 and the total was now 194,566. Of these 131,154 were in Buenos Ayres and suburbs. The programme of converting the manual-operated exchanges in Buenos Ayres to automatic had been continued and the most important exchange known as the "Avenida" was changed over in a new building built for that purpose and also for housing the administrative and accounting departments. Extensions were also carried out to other automatic exchanges and over 60 per cent. of the equipment in the capital was now actually working on an automatic basis. At the present moment equipment equal to 53,000 lines was in course of installation or manufacture. When this was completed—at about the end of 1931—Buenos Ayres would be approximately 90 per cent. automatic. The laying of the underground trunk cable between Buenos Ayres and Rosario had been postponed, but carrier equipment enabling several conversations to be superimposed upon the existing circuits had been installed and would shortly be brought into service. Carrier equipment had also been installed between Buenos Ayres and Bahia Blanca and this was expected to be opened for public service shortly. Practically all of their 430 exchanges in the Argentine Republic were connected to the city of Buenos Ayres. The total mileage of single wire provided was now approximately 703,000, of which 50,000 miles represented aerial long-distance and junction lines. The staff had increased from 10,500 to 10,601. The report and accounts were adopted.

Electric Construction Co., Ltd.

The annual general meeting was held on June 18th, the managing director (Mr. James Gray) presiding in the absence of the chairman through indisposition. In submitting the report (*vide*, ELEC. REV., May 31st, p. 977), Mr. Gray said that it was with much regret that the directors submitted accounts showing a large reduction in net profit. This would appear the more inscrutable when he told them that the demand for electrical machinery had been well maintained during the past financial year. The volume of work produced, stated in kilowatts, exceeded the previous year by 40 per cent., and, in fact, was the largest output that the company had accomplished. This activity was probably general, but the supply for the time being exceeded demand, and prices had consequently drifted to a level which left little or no margin over the costs of production. It would interest them to know that the average reduction in prices during the past five years had been not less than 30 to 40 per cent. On two previous occasions they had indicated how the operation of the Electricity Act, 1926, should benefit them, and while much had been accomplished by the Central Electricity Board, their orders so far had been chiefly for large turbo-alternators and high-pressure distribution lines, in the manufacture of which they were not engaged. When the time arrived, however, for replacing the present 25 cycle motors, manufacturers like themselves would have a better opportunity of obtaining a share of the developments now proceeding. Reviewing the whole position, they did not take a pessimistic view of the prospects. They felt that the conditions were only transient, and were capable of being solved by manufacturers themselves. It was in this spirit that the board decided to transfer £10,000 from the dividend equalisation fund to enable a final dividend on the ordinary shares to be paid this year. This fund was constituted entirely from undistributed profits after the war with the intention of providing against evil days, and, much as they regretted the necessity of drawing upon the fund, they thought that they were entitled to a little credit for foresight which was not conspicuous among many larger concerns at that time. The report was adopted.

Whitehall Electric Investments, Ltd.

The annual meeting was held on June 20th. The Hon. Clive Pearson (chairman) presided, and in presenting the report and accounts (ELEC. REV., June 21st, p. 1114) said that an agreement was signed in October last for the sale of holdings in the various Chilean and Mexican companies to the American and Foreign Power Co., Inc. The sales of their investments realised a profit of £2,738,793. Referring to the formation of Hallminster Investments, Ltd., and Whitehall Canada, Ltd., these subsidiary companies would act as preliminary investigators and only the finally selected investments would take their place among the securities held direct by the company. Through the intermediary of Whitehall Securities Corporation, Ltd., they had acquired controlling interests in a number of companies operating electricity undertakings in Devon and Somerset. Statutory powers were being obtained for the development of a large area in which these undertakings would be linked up by h.p. transmission lines, and the service extended to neighbouring towns and villages. The provision of a bulk supply of electricity was being negotiated and energy would also be available from the "grid" when in due course this reached the district. So far as plans had matured, this enterprise would require an investment of some £750,000 over the next two or three years. The extensions which would be made in the system of distribution would reach many districts not yet served, and it was anticipated that at the same time the *per capita* consumption of the present users of electricity would respond to the improved facilities which would be provided. The directors were considering other investments in electrical and other public utility undertakings, in some of which they anticipated obtaining share control. The company's assets had been considerably increased, and its earning capacity consequently enhanced. The trustees for the debenture stock holders held shares and securities having a value of over £5,000,000. The report and accounts were adopted.

General Electric Co., Ltd.

The profit for the year ended March 31st last amounted to £1,084,078, as compared with £1,057,867 in 1927-28. A balance of £338,456 brought forward is added, making £1,422,534. From this are deducted debenture interest, depreciation (£206,055), contribution to pension fund (£24,662), and preference dividends, and £130,000 (as last year) is put to reserve. It is proposed to maintain the ordinary dividend at 10 per cent., and £362,072 remains to be carried forward. The directors point out that the gradual improvement referred to in last year's report has been maintained. During the period the company's works have been fully employed. The output, both

at the heavy engineering works and at the telephone works, has reached a high level, and the volume of orders received has been satisfactory. The demand for general electrical commodities has shown a steady expansion, which has to some extent counteracted a tendency towards lower prices. The volume of overseas trade has been well maintained. The branches in India and Argentina have had another successful year, and some improvement occurred in South Africa. In Australia and China, however, conditions have remained difficult. The growth of the company's business has called for additional accommodation for both the manufacturing and sales organisations. New h.p. switchgear and transformer works have been erected at Witton, and the head office has been extended by the purchase of adjoining premises. The liquid resources of the company have been reduced from £1,780,000 to £1,519,000. The number of employés at the end of March last was 22,237. The annual meeting is to be held at Magnet House on July 4th.

Delhi Electric Supply and Traction Co., Ltd.

The accounts for the year ended December 31st last record a net profit of £59,558 against £49,639 in 1927, the conversion rate being 1s. 4d. per rupee in each year. Since January 1st, 1929, the rate has been raised to 1s. 6d. After adding profit on exchange, interest, &c., and deducting expenses there remains £62,887 to which is added £1,582 brought forward, making £64,469. The general reserve receives £25,028, £10,000 is allocated to depreciation and renewals, £8,000 to taxation reserve and £1,500 to staff benefit. A final dividend of 8 per cent. is recommended, making 12 per cent. for the year, as for 1927. Negotiations are in hand for obtaining a bulk supply from the Government power station at New Delhi. Reductions in charges were made in November last and further reductions are contemplated, dependent upon favourable terms for the bulk supply. Mr. K. A. Scott-Moncrieff has been appointed to the board. An extraordinary meeting is called for July 1st for the purpose of considering resolutions dealing with the directors' remuneration, the capitalisation of profits, &c. It will also be proposed that the capital of the company be increased to £200,000 by the creation of 30,000 new shares of £1 each, and that £50,000 of the undivided profits be capitalised for distribution as bonus shares to the existing shareholders. These resolutions, if passed, will be submitted for confirmation at the annual meeting on July 17th.

Stock Exchange Notices.

The officially undermentioned have been ordered to be quoted :—

Chelsea Electricity Supply Co., Ltd.—8,989 ordinary shares of £1 each, fully paid, Nos. 425,489 to 434,477.

Constantinople Telephone Co.—£1,496 six per cent. certificates (bearer) of £22 each, fully paid, Nos. 4,353 to 4,399 and 4,401 to 4,421.

Ever-Ready Co. (Great Britain), Ltd.—395,200 ordinary shares of 5s. each, fully paid, Nos. 1,976,001 to 2,371,200.

Mersey Power Co., Ltd.—550,000 6 per cent. cumulative preference shares of £1 each, fully paid, Nos. 1 to 550,000.

Underground Electric Railways Co. of London, Ltd.—2,949 ordinary shares of £1 each, fully paid, Nos. 7,164,609 to 7,167,557.

Callender's Cable and Construction Co.—186,000 ordinary shares of £1 each, fully paid, Nos. 930,001 to 1,116,000.

Dealings in the following have been allowed by the Committee under Rule 159 :—

British Electric Traction Co., Ltd.—19,788 new deferred ordinary shares of £1 each, fully paid, Nos. 214,482 to 234,269.

Application has been made to the Committee to allow the following to be officially quoted :—

Central Electricity Board.—£3,000,000 Central Electricity 4 per cent. stock, 1959-89, scrip fully and partly paid.

Lisbon Electric Tramways, Ltd.

The report for the year ended December 31st last shows a net profit of £161,399, as compared with £161,876 in 1927. A balance of £17,587 brought forward is added, making £178,986. From this £50,000 is transferred to reserve, £10,000 to exchange reserve, and £10,000 to the staff benefit fund. A final dividend of 4 per cent. is recommended on the ordinary shares, making 7 per cent. for the year, as against 6 per cent. in the previous year, leaving a balance of £16,880, carried forward. During the year the number of passengers carried increased by 8,293,536 to 112,874,963. The report refers to the death of Mr. A. O. Kolkhorst, the general manager and chief engineer, and the appointment of Mr. R. H. Harvey as his successor.

British Electric Traction Co., Ltd.

The accounts of this company were abstracted in our issue of June 7th, p. 1022, and the annual meeting was held on June 17th. Mr. J. S. Austen (chairman), who presided, said that the profits for the past year showed an advance of £17,000. The holding in the London and Suburban Traction Co. had been sold. That was an amount of nominally over £850,000, and was the largest holding the company had in any single undertaking. Referring to the sale of the Shropshire, Worcestershire and Staffordshire Power Co., in which they held about one-third interest, it was rather difficult to give the exact amount of profit which was made out of the deal, because the shares were mainly held by associated companies of which they did not hold the entire share capital, but the profit came nearer £700,000 than to £600,000. With regard to earnings, at the moment they were lagging behind the capital value. The reason for that was merely that they had received money which was not immediately remunerative. The chairman concluded with a reference to the retirement of Mr. Garcke. The report and accounts were adopted.

Brazilian Traction, Light and Power Co., Ltd.

The annual meeting was held in Toronto on June 20th. Mr. Miller Lash (president), in calling attention to the reconstruction and extension of the mechanical shops in Rio de Janeiro and Sao Paulo, pointed out that their scope was not limited to repair work, but a great deal of material required for the company's business was manufactured in them more quickly and at less cost than if the material was imported. In referring to the telephone section of the enterprise, he mentioned that the installation of the automatic telephone system at Bello Horizonte was being proceeded with, and the telephone system in the neighbourhood of Cataguazes, consisting of about 1,000 telephones and 1,200 km. of toll lines, was being acquired. The company had acquired two telephone companies during the year. The report and accounts were adopted.

Marconi's Wireless Telegraph Co., Ltd.

The directors announced last week that sufficient shares of the company had already been deposited with the Bank of England under the Merger Plan to warrant their concluding that the required percentage of "assented" shares would be obtained to enable the Plan to become operative. Having regard, however, to the imperial and national importance of the scheme, they expressed the hope that the number of "assented" shares would be much in excess of the minimum required merely to put the Plan into operation. Consequent upon this announcement it was stated that the committees formed for the protection of the holders of the company's £1 shares had decided that owing to insufficient support they did not intend to proceed with their scheme for the formation of a holding trust. Those who do not assent to the Merger Plan will remain shareholders of the Marconi Co.

Swedish-Mexican Telephone Company.

The report for 1928 of the Mexikanska Telefon A.B. states that the company has obtained a renewed concession from the Government within the Mexican Federal Area for a period of 50 years in place of the old concession which would have expired in 1933. During last year there was an increase in the number of connections, both in Mexico City and in the country's network; the local systems in Pachuca and Morelia were taken over, and the extension of the general network and interurban lines proceeded in a satisfactory manner. The accounts show net profits of 1,224,000 kr., and the dividend remains at 18 kr. per share.

Victoria Falls and Transvaal Power Co., Ltd.

A final dividend of 1 per cent. (making the maximum of 10 per cent. for the past year) has been declared on the preference shares, together with a dividend of 3 per cent. in respect of the half-year ending June 30th. The final ordinary dividend is 12 per cent., less tax, making 15 per cent. for the year (as for 1927).

Chadburn's (Ship) Telegraph Co., Ltd.

The report for the year ended March 31st last shows that after certain sums have been written off for depreciation, &c., and a debit balance of £1,570 in the previous year has been allowed for, there remains £5,022. The directors propose to pay dividends on the preference shares, leaving £1,422 to be carried forward.

Major & Co., Ltd.

The profit for the year ended March 31st last was £12,190, to which is added £1,252 brought forward, making £13,442. The directors recommend that dividends be paid on the preference shares, leaving £2,942 carried forward. The position of the company has so far improved that it is hoped to resume payment of dividends next year on both classes of ordinary shares.

Meters, Ltd.

Speaking at the annual meeting on June 20th, the chairman (Mr. G. H. Braddock) said that the past year had been one of considerable anxiety to the management owing to the reduced demand for meters and to certain changes in types. Their electricity meter company, British Electric Meters, Ltd., continued to progress, and bade fair to prove a successful and valuable property soon.

Greenwood & Batley, Ltd.

The net profit for the year ended March 31st last was £28,385, to which is added £13,459 brought forward, making £41,844. After allocating £6,000 to depreciation, the directors recommend a final dividend of 2½ per cent. on the ordinary shares, making 5 per cent. for the year (same as last year), and £11,397 is carried forward.

Worcester Electric Traction Co., Ltd.

The net profit for 1928 was £8,113, to which is added £1,539 brought forward, making £9,652. The directors propose to place £2,738 to reserve, and pay a dividend of 5 per cent. for the year on the ordinary shares, leaving £2,144 carried forward. The whole of the tramways and light railways of the company were taken over by Worcester Corporation on May 31st, 1928, and the completion of the purchase took place on March 1st last.

Edmundson's Electricity Corporation, Ltd.

The report for the year ended March 31st last states that the 4½ per cent. first mortgage debenture stock, amounting to £328,077, has been redeemed. The net profit for the year was £149,272, after providing for income-tax and debenture interest to date of redemption (against £125,083 for 1927-28). A balance of £38,388 is added, making £188,660. From this the preference dividend is paid; £8,501 is written off capital expenses; £25,000 is placed to reserve; and £3,000 to staff benevolent fund. It is proposed to pay a final ordinary dividend of 4½ per cent., making 8 per cent. for the year in the case of the old shares (against 10 per cent.), and leaving £34,159 to be carried forward. Sir James Devonshire, K.B.E., and Sir Douglas Newton, K.B.E., M.P., have been appointed directors, and the former has been elected chairman.

J. G. White & Co., Ltd.

The net profit for the year ended February 28th last was £71,661, to which is added £5,157 brought forward, totalling £76,818. Dividends paid absorb £72,000, leaving £4,818 carried forward.

Rothesay Tramways Co., Ltd.

The net profit for 1928 was £4,513, and after setting aside £4,022 for depreciation and adding £1,855 brought forward, there remains £2,346. The directors propose to pay a dividend of 5 per cent. on the preference shares, leaving £1,846 carried forward.

W. T. Henley's Telegraph Works Co., Ltd.

The directors recommend a final dividend on the ordinary shares of 2s. 6d. per share, making, with the interim dividend of 1s. 6d. per share already paid, 4s. per share for the year, as for 1927-28. They also recommend a cash bonus of 2s. per share (against 1s.).

Edgar Allen & Co., Ltd.

The net profit for the year ended March 31st last was £16,783, as compared with £22,366 in 1927-28. It is again proposed to pay a dividend of 2½ per cent., free of tax, for the year on the ordinary shares, leaving £7,101 carried forward.

Wemyss and District Tramways Co., Ltd.

The net profit for 1928, including £167 brought in, was £7,817, and after providing for reserves in subsidiary companies (£4,096), interest (£6,560), debenture stock redemption account (£200), and placing £1,000 to reserve, there is a balance carried forward of £56.

A Large Japanese Issue in America.

An issue of $11,450,000, three year, 6 per cent. gold notes of the Toho Electric Power Co., Japan, at a price yielding over 7.40 per cent. was offered in New York last week.—*Reuter.*

Companies Struck Off the Register.

The names of the undermentioned companies have been struck off the Register and they are thereby dissolved:—

City of London Radio Corporation, Ltd.
Southern Lighting & Ignition Co., Ltd.

Montreal Light, Heat and Power Consolidated.

A dividend has been declared on the common shares of $0.60 per share for the quarter ending June 30th.

East African Power and Lighting Co.

The directors recommend a dividend on the ordinary shares of 6½ per cent.

French Companies.

The *Société de Manufacture Parisienne de Fils et Cables Electriques* reports net profits for 1928 amounting to 173,000 fr.; the dividend is 10 per cent.

The *Société des Etablissements Gaiffe-Gallot et Pilon* records a net surplus of 2,399,000 fr. for 1928, including the balance forward; a dividend of 30 fr. per share is being paid.

The *Société de Constructions Electriques de France* records gross profits of 10,297,000 fr. for 1928, as against 10,962,000 fr. in the previous year. The net profits, which have been carried forward, amount to 851,000 fr., as compared with 129,000 fr. in 1927.

The *Compagnie Parisienne de Distribution d'Electricité* reports gross profits of 108.8 million fr. for 1928, as compared with 103.6 millions in the previous year. The net profits are returned at 35.4 million fr., permitting of the payment of a dividend of 65 fr. per share, as in 1927.

Stocks and Shares.

MONDAY EVENING.

THERE are too many counter-attractions for the ordinary man and woman to pay any particular heed to Stock Exchange markets at the present time. With the end of the first half of the year, a mild amount of window-dressing takes place, and, although there is little likelihood of an alteration being made in the Bank Rate, the approach of every Thursday brings in its train a shade of uneasiness that finds reflection to-day in the dullness which prevails amongst gilt-edged securities. New issues are going none to well. In regard to those that came out last year, many stand at such heavy discounts as to suggest that there must be a very large section of the public holding shares at prices substantially higher than those current to-day. The inference is that a great deal of capital is locked up in more or less non-productive channels; and, also, that a great deal of it will turn out, ultimately, to have been lost.

Electricity Supply.

The markets for what may be described as investment industrials show some degree of irregularity. Electrical supply descriptions are mainly very firm. County of London ordinary rose to 56s. Electrical Distribution of Yorkshire shares are better at 37s., and Midland Counties, after dipping to 1 11/16, recovered to 35s. British Power & Light shares are dull at 1s. discount. Scottish Power went back a few pence, but rallied to 33s. 6d. Atlas dropped to 28s. 6d., Northamptons, in which there seems to be a fairly large speculative account, went back to 51s. 6d. after being 53s. There was a recovery from the lower price, and at the time of writing the shares stand at 52s. 3d. Electric Supply Corporation shed 2s. 6d., and are 53s. 9d. A good deal of business is taking place in this department. Activity centres around a few of the shares, of which County of London and Northampton make good examples. A rise in Delhi Electric Supply & Traction lifted the price to 2¾. Bagdad Tramways & Electric Lighting "A" shares can be sold, jointly with the "B," for 20s. and 1s. respectively.

Whitehall Electric.

Whitehall Electric preference are unchanged. The chairman took advantage, at the meeting last week, to explain at some length why the directors decided to dispose of the company's Chilean and Mexican holdings. He pointed out that the offer of the Americans was made at an attractive price, and that the money received by the Whitehall Electric Investments would enable the company's interests to be spread over more than two countries. From the American point of view, the buyers were advantaged, however, in being able to extend their interests in the two countries already mentioned. The Whitehall Electric Company is understood to have acquired a fairly large interest in certain electrical undertakings which operate in Devonshire and Cornwall.

Marconis.

The directors of Marconi's Wireless Telegraph Company, in announcing that sufficient shares of the company had already been deposited with the Bank of England, under the plan of May 14th, to make the plan operative, venture to hope that a much greater number of shares than 60 per cent. will come into the proposed re-arrangement. It would almost appear as though a good many Marconi shareholders, taking it for granted that the plan would go through, have not troubled to send in their assent, and that the directors wish to persuade as many as possible of their fellow-proprietors to agree to the scheme. It is reported that a good proportion of the cable companies' shareholders have sent in their compliance with the proposals. Unless the time is extended, the last day upon which share certificates can be deposited with the Bank of England is Friday in this week. The intention to form an investment company has been abandoned by those who proposed this step to holders of Marconi £1 and preference shares. The committees adhere to the view that although the market in the £1 shares is likely to be a restricted one, those holders who decide to stand out of the merger company will ultimately benefit.

The price of Marconi Marines is 1/16 better at 3¼, that of the parent shares remaining at 3⅝. Movements in the cable stocks and shares have been uninteresting. A new company is projected for exploiting a television apparatus, to be sold at 50s., which is now under the consideration of the Postmaster-General and Herr von Mihaly, its Hungarian inventor. Applications for the newly-issued Venezuelan Telephone shares had to be sent in, accompanied by £1 per share for full payment, on Wednesday in this week at the latest. The price of these new £1 shares is about 2s. 6d. premium, the old, preference and ordinary alike, being 25s.

Henley's and G.E.C.

Henley's announce a final dividend of 2s. 6d., making 20 per cent. for the year, and a cash bonus of 2s. The latter is 1s. more than last year's distribution, so that dividend and bonus come to 30 per cent. as compared with 25 per cent.

The shares have risen ½ on this eminently satisfactory result, but the yield on the money is still so meagre as to hint at hopes being entertained of fresh favours to come in the shape of new issues at some future date. The General Electric Company has decided to repeat its previously-paid dividend of 10 per cent. on the ordinary shares. The company's profit of £1,084,077, for the year ended last March, was £26,200 more than that of the preceding twelve months. The incident of the company's proposed new issue of shares, the acrimonious discussions thereby aroused, the visit of American delegates, and the withdrawal of the share-offer at the very last moment, are all too fresh in public memory for them to require more than passing reference. The present price of the ordinary shares is 2⅛, about 1/16 lower, on the dividend announcement. Earlier this year it rose at one time to 4¼. The 6½ per cent. preference shares stand at 23s.

Other Manufacturing Shares.

Partly by reason of the good Henley's result, British Insulated have risen 3/16 to 3⅜, and Callenders a similar fraction to the same price. Enfields are ⅛ up at 4⅜. The demand for all these shares has been so steady for months past that the supply is now limited. Siemens have gone back a trifle to 30s. 9d. The preferences keep good at 33s. Crompton Parkinson ordinary are firmer at a guinea. There has been an abrupt shake-out in Associated Electrical Industries ordinary shares. At 46s. 3d., the price shows a fall of 5s. 9d. New York is supposed to have provided the shares whose sale caused the fall in the price. India Rubber shares weakened to 15s. Ever Readys at 21s. 6d. have given way a little. Amongst iron and steel descriptions, Vickers are a dull spot at 9s. 4½d. Nothing favourable in the rubber market has occurred to arouse the list of prices from its somnolence.

Home Railway Hopes.

Marked improvement took place in Home Railway stocks following upon an informal conference between Mr. J. H. Thomas and the companies. The meeting is to be the first of a series designed, apparently, to assist the railways to a position wherein they will be better able to co-operate in the Government's policy for provision of more employment. This is not the way in which the official statement phrases the announcement, but the Stock Exchange market decided that something was going to be done for the railways, and, in the advance of steam stock prices, Underground Electric participated, the incomes being 2 up, at 110. Central London Assented Ordinary is 1 down, at 72, and Districts eased off to 76. Other London traction issues are dullish, with London United Tramways 4 per cent. debenture a couple of points down at 62. British Electric Traction deferred is 25 lower at 1,375, a drop that does not look serious when matched against the rise of 350 points secured earlier in the present month.

Dollar Stocks.

Holders of American Telephone & Telegraph stock are given the opportunity for subscribing to a new issue of 4½ per cent. gold bonds. On these there is a market premium of 4 to 5 points, for the bonds make a sound investment and are good enough to take up. It is greatly to be feared that many investors, failing to realise the value of rights, neglect to take advantage of the profits that they can secure, and to which they are properly entitled. American and other dollar stocks have developed strength. Hydro-Electrics are up to 40¼. Brazilian Tractions at 59½ have gained 3 points. From Brussels it is reported that a new company with a capital of 500 million francs has been formed to operate electrical and public utility enterprises in various European countries.

British or American Control.

Quite a lot of very interesting discussion centres upon the question as to whether it is a good thing or not for British companies to prohibit foreign interests from obtaining any measure of control. Foreign, in this connection, is usually another name for American. A number of well-known British companies—and every week adds fresh names to those already on the list—have taken steps that preclude the possibility of control passing out of British hands. This is tantamount to telling the Americans that they may buy our shares as investments, but that they can expect no power in shaping a company's policy or its development. In other words, foreign capital is discouraged instead of being invited, contrary to the practice of various European nations which have found the influx of American money a useful stimulus to their commercial energies.

American Money.

Protagonists of the theory of free trade in such a matter maintain that, if Americans think themselves capable of managing our industries better than we can, they might just as well be allowed to try, provided they pay a much higher price than the industries are valued at on the basis of current Stock Exchange quotations. The Americans' experience over their purchase of the White Star line is not such as to prove that the British sellers are always wrong. To the average mind, there is something rather disturbing in the fact that even a theorist can cast doubt upon the apparent truism that British control is essential for British companies.

Share List of Electrical Companies.

Home Electricity Companies.

	Nom.	Approx. Dividend. 1927.	1928.	Price June 24 1929.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	65/9	—	4 11 4
Brompton Ordinary	1	8½	8½	26/-	—	5 7 8
Charing Cross Ordinary	1	8½	8½	26/6	—	5 5 8
do. do. 4½% Pref. ...	1	4½	4½	17/6	—	5 2 10
Chelsea	1	8⅞	8⅞	26/6	—	5 5 8
City of London	1		10	33/8	—	4 4 8
do. do. 6% Pref....	1		6	23/-	—	5 4 4
Clyde Valley	1		8	36/8	—	... ...
County of London	1	7½	10	56/-	+6d.	3 11 5
do. do. 6% Pref....	1	6	6	23/-	—	5 4 4
Edmundson's 7% Pref.	1	7	7	25/-	—	5 12 0
Elec. Supply Corporation ...	1	11	—	53/9	+⅛	4 1 9
Kensington Ordinary	1	8	8	26/6	—	5 5 8
Lancs. Light and Power	1	7½	7½	29/-xd	—	5 8 8
London Electric	1	8½	9	28/-	—	5 0 0
Metropolitan	1	9	9	47/6	—	3 16 0
do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Midland Counties	1	6½	6½	35/6	+1/-	3 14 4
Mid. Elec. Power	1	15	8	37/6	—	4 5 4
Newcastle-on-Tyne Ordinary ...	1	6	6	27/-	—	4 9 0
do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	11	—	5 9 1
North Met. Elec. 6% Pref. ...	1	6	6	23/-	—	5 4 4
St. James' and Pall Mall	1	8	8	27/6	—	5 1 10
Scottish Power	1	8	8	33/6	+6d.	4 15 7
South London	1	8½	8½	26/6	—	5 5 8
Urban Ordinary	1	7	—	2	—	... ...
Westminster Ordinary	1	8½	8½	26/-	—	5 7 8
Whitehall Elec. Invst. 7½% Pref. ...	1	7½	7½	24/9	—	6 1 2
Yorkshire Elec.	1	8	8	33/6	—	4 7 8

Home Rails.

Central London Ord. Assented ...	Stock	4	4	72	—1	5 11 1
Metropolitan	„	3	3½	60½	—	5 15 8
do. District	„	4	5	76	—½	6 11 7
Underground Electric	£1	5	7	29/-	+6d.	6 1 9
do. do. Income ...	Bonds	6	6	110	+2	5 9 1

Telegraphs and Telephones.

Anglo-Am. Tel. Pref.	Stock	6	6	103	—	5 16 6
do. Def.	„	1½	1½	24½	—	6 2 6
Automatic Telephone	1	10	12½	2⅞	—	6 1 1
Eastern Extension	10	10	10	26⅜	—	*3 15 6
Eastern Tel. Ord.	Stock	10	10	265	—	*3 15 6
Globe Tel. and T. Ord.	10	10	10	27½	—	*3 19 6
do. do. Pref.	10	6	6	11⅜	—	5 5 6
Great Northern Tel.	10	20	—	31½	—	... ...
Indo-European	25	10	10	50½	—	*4 19 0
Marconi	10/-	10	20	3⅝	—	... ...
Marconi-Marine	1	12½	15	3¼	+⅛	4 12 4
Oriental Telephone Ord.	1	12	12	3½	+	... ...
Western Telegraph	10	10	10	26½	—	3 15 6

Home and Foreign Trams, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	3⅞	—	7 14 4
do. do. 2nd Pref. ...	5	6	6	3⅞	—	8 5 6
do. do. 5% Deb. ...	Stock	5	5	74½	—	6 14 3
British Electric Traction Def. Ord.	„	5	5	1375	—25	... ...
do. do. Pref. Ord.	„	8	8	130½	—	6 2 7
Brazil Traction	100	7	8	59½	+3	3 7 8
Brit. Columbia Elec. Ry. Pcc. ...	Stock	5	5	94½	+½	5 5 10
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	11/6	—	... ...
London United Tram Deb. ...	Stock	4	4	62	—2	6 9 1
Mexico Trams, 5% Bonds	—	5	5	75½	—	6 13 9
Mexican Light Common	100	Nil	Nil	74½	—	... ...
do. 7% Pref.	100	7	7	74½	—	9 8 0
do. 1st Bonds	—	5	5	77½	—	6 9 0
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	... ...

Manufacturing Companies.

		1927.	1928.			
Assoc. Elec. Ord.	1	6	—	46/3	—5/9	2 12 6
Babcock & Wilcox	1	15	15	68/9	—	*4 14 4
British Aluminium Ord.	1	10	10	51/3	—	*3 18 9
British Elec. Transformer Pref. ...	1	7	7	13/9	—	9 6 8
British Insulated Ord.	1	15	15	8⅞	+⅛	3 17 4
Brush Ord.	1	10	10	27/6	—	7 5 6
Callenders	1	15	15	3⅜	+⅛	3 17 4
do. 6½% Pref.	1	6½	6½	1⅛	—	5 4 0
Crompton Parkinson Ord.	5/-	—	—	21	+1/-	... ...
do. 8% Pref.	1	8	—	25/-	—	6 8 0
Edison-Swan 1st Pref.	1	7½	7½	25/9	—	7 1 2
do. 5% Deb.	Stock	5	5	80½	—	5 15 7
Electric Construction	1	7½	5½	18/9	—	5 17 4
Enfield Cable Ord.	1	20	20	4⅜	+⅛	4 11 4
English Electric	1	Nil	Nil	6/8	—	... ...
do. do. Pref.	1	3	Nil	8/3	—	... ...
Gen. Elec. Pref.	1	6½	6½	23/-	—	5 13 1
do. Ord.	1	10	10	2⅝	—⅛	3 16 4
Henley	1	25	30	6⅝	+⅛	4 10 0
do. 4½% Pref.	5	4½	4½	4⅜	—	5 6 0
India-Rubber		Nil	Nil	15/-	+⅛	... ...
Johnson & Phillips		10	—	36/3	—	5 10 4
Siemens Ord.	1	7½	7½	30/9	—6d.	4 17 7
Telegraph Construction	12	10	10	23½	—½	*4 19 3

* Dividends paid free of Income Tax.

Our Foreign Electrical Trade.

Electrical Exports and Imports during May.

IF the General Election activities had any effect at all upon our electrical export and import trade during May, it was not an adverse one. The Board of Trade returns show that in the three sections—exports, imports, and re-exports—values were higher than in the previous month and in May, 1928. The general exports from this country also showed substantial increases in the two comparisons.

Electrical exports during May reached the highest level recorded since September, 1926, when submarine cable rose to the abnormal figure of £668,510. Last month submarine cable was responsible for only a small contribution to the large total. The greatest increase as compared with April occurred in the item "Insulated wires and cables." In the machinery section there was a net increase of about £51,000, while unenumerated electrical goods rose by nearly £46,000. Meters and instruments showed the largest proportional rise. The decreases were not of important dimensions. In comparison with May last year, the total increased by over a quarter of a million. This was mainly due to rises in unenumerated goods and apparatus (£114,395), insulated wires and cables (£109,906), and non-submarine telegraph and telephone wires and cables (£66,268). The machinery section showed a net decrease of £45,213; the other decreases were mainly of a minor nature. The month's augmentation of exports has raised the total for the completed portion of the year above that for the corresponding period of 1928, although it will be seen that the increase in imports has been much greater.

The import total for May was also well above the average and over £75,000 above the preceding month's figure. Among the items the increases and decreases were equal in number, the outstanding item being a rise of £38,000 in the machinery class. The greatest decrease (£11,889) occurred in the case of carbons. The May imports were over £150,000 above those of the corresponding month of last year, attributable chiefly to rises in telegraph and telephone apparatus (£52,439), unenumerated goods and apparatus (£30,441), and insulated wires and cables (£28,035).

There was a substantial increase in the value of re-exported goods, mainly in the unenumerated class.

The following table analyses the electrical machinery exports during May according to destinations:—

Destination.	May, 1928.	May, 1929.	Inc. or dec.
	£	£	£
Europe	94,037	98,467	+ 4,430
Japan	28,962	7,752	−21,210
South America ...	82,665	40,219	−42,446
South Africa ...	42,826	40,169	− 2,657
British India ...	113,754	112,432	− 1,322
Australia ...	112,906	92,552	−20,354
New Zealand ...	18,083	13,855	− 4,228
Canada	32,685	37,184	+ 4,499
Other countries ...	80,651	118,726	+38,075
Totals ...	£606,569	£561,356	−£45,213

In view of the general increase in exports, this decline in the machinery class is notable. Exports to South America were halved, while Japan and Australia took considerably smaller quantities. It is interesting to see that shipments to European countries keep up well, as this near-at-hand market is generally the most difficult to penetrate. Assuming "other countries" to be outside the Empire, foreign markets absorbed about two-fifths of the electrical machinery exports, while the Dominions took three-fifths.

During the first five months of the year the total value of British electrical machinery exports was £2,733,171, as compared with £2,843,528 in the corresponding period of 1928. There were decreases in the two specified classes, but a rise in the unenumerated section. Exports to British India showed an increase of over £160,000, and those to European countries rose by about £47,000. On the other hand, South America's share fell by about £194,000, and that of "other countries" by £86,000.

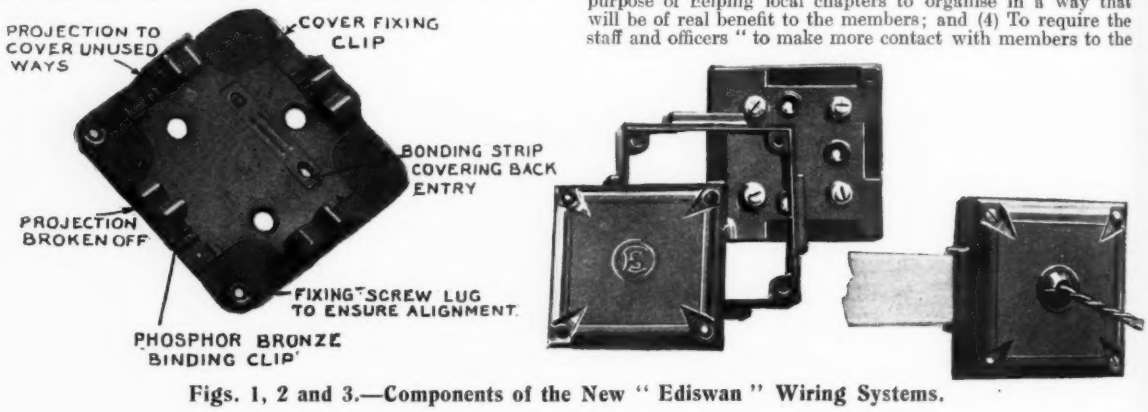
	Exports.			Imports.			Re-Exports.		
	Electrical exports for May, 1929.	Inc. or dec. as compared with April, 1929.	Inc. or dec. as compared with May, 1928.	Electrical imports for May, 1929.	Inc. or dec. as compared with April, 1929.	Inc. or dec. as compared with May, 1928.	Electrical re-exports for May, 1929.	Inc. or dec. as compared with April, 1929.	Inc. or dec. as compared with May, 1928.
Electrical goods and apparatus (unenumerated)	£324,154	+ £45,995	+ £114,395	£131,229	− £1,055	+ £30,441	£11,779	+ £5,182	+ £4,291
Insulated wires and cables ...	340,101	+ 54,800	+ 109,906	82,534	+ 16,720	+ 28,035	1,670	+ 1,161	+ 537
Glow lamps	61,203	+ 8,565	+ 9,881	23,000	− 376	− 4,138	640	− 57	+ 491
Arc lamps and parts ...	712	− 1,328	− 1,499	1,115	+ 749	− 3,003	—	− 41	—
Batteries and accumulators ...	85,864	+ 9,713	− 6,776	51,019	+ 8,394	+ 3,579	1,464	+ 1,266	+ 492
Meters and instruments ...	47,379	+ 17,346	+ 8,528	29,338	+ 14,813	+ 10,399	809	− 489	+ 489
Carbons	384	− 314	− 524	9,880	− 11,889	− 28	380	+ 162	+ 225
Switchboards (not telegraph or telephone)	3,928	− 1,129	− 517	—	− 131	− 4,524	43	+ 37	+ 18
Electrical Machinery—									
Electrical machinery (unenumerated)	325,349	− 3,743	− 6,687	184,128	+ 38,151	+ 3,700	13 928	+ 2,083	+ 1.107
Railway and tramway motors	23,916	+ 8,338	− 40,460	—	—	—	—	—	—
Other motors and generators...	212,091	+ 46,417	+ 1,934	—	—	—	—	—	—
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cable (not submarine)	138,372	− 7,196	+ 66,268	3,488	− 2,583	+ 472	—	—	− 67
Submarine telegraph and telephone cable	15,361	− 5,903	+ 5,060	—	—	—	—	—	—
Telegraph and telephone instruments and apparatus ...	271,430	+ 4,389	− 8,515	102,954	+ 12,655	+ 52,439	5,994	+ 1,332	+ 3,890
Totals	**£1,850,244**	**+ £176,010**	**+ £250,994**	**£618,685**	**+ £75,448**	**+ £150,672**	**£36,707**	**+ £10,636**	**+ £11,493**
	Exports			Imports			Re-Exports		
Increases for five months ...	+ £171,277			+ £250,057			+ £1,291		

Electrical Installation Notes.

Recent Developments at Home and Overseas.

New Ediswan Wiring Systems.

In the concluding instalment of our description of the I.M.E.A. Convention Exhibition last week we gave some illustrated particulars of the new wiring systems evolved by the Edison Swan Electric Co., Ltd. On Thursday last week the systems were explained in some detail at a gathering of technical Press representatives. Supplementing the information which we have already given, we may say that the accessories appear to have been designed to facilitate the work of installation in every direction and to make a neat and safe job independent of the wireman's skill. In the earthed metal system the most notable accessory is the connector box, which is a unique example of mild-steel press-work. The four ways are closed in by means of easily-removed bent-up pieces, and a visible bonding clip of special design holds the cables against a very strong pull. The box is square and, with variations in the cover, is used for all positions—as a ceiling rose, switch box, plug box, &c. Only two fixing screws are necessary. When used as a ceiling rose the box is equipped with a novel and very efficient cord grip suitable for circular or twisted flex; this has slots which engage with projections in the centre hole, and screwing is thus rendered unnecessary. A connector similar to the "Ramie" porcelain thimble is used, but safe connection is ensured by the use of a cadmium-coated steel spring. The spring is inside the porcelain thimble, and once the pair are screwed home the thimble can be run back to enable the spring to be inspected in position. To assist in tightening up, a porcelain box spanner is provided; the other end of this is threaded and can be used to twist up the wires in the first place. Binding strips and special earth clips form another feature of the system. As regards the insulated system, its principal attribute is its neatness and handsome appearance. Chocolate coloured bakelite is used for the boxes which are cleanly moulded. The box is in three parts: the base and cover are of common design and there is an intermediate piece, forming the sides, which is suited to the purpose of the box, *e.g.*, tee, three-way, etc. As a ceiling rose the box employs the special cord grip already mentioned. The entries are fitted with extension pieces to shroud the ends of the channelling, obviating the necessity for careful shaping or fitting. The channelling is of magnolia, a hard and handsome wood; it is erected after the running of the wires by merely pushing it over phosphor-bronze spring clips which are entirely concealed. Moulded corner pieces are provided to eliminate mitreing and both surface and internal angle patterns are made to shroud the ends of the channel. The system has been designed principally for use with the company's "Virite" cable or flat c.t.s. cable.


PROJECTION TO COVER UNUSED WAYS
COVER FIXING CLIP
BONDING STRIP COVERING BACK ENTRY
PROJECTION BROKEN OFF
FIXING SCREW LUG TO ENSURE ALIGNMENT
PHOSPHOR BRONZE BINDING CLIP

Figs. 1, 2 and 3.—Components of the New "Ediswan" Wiring Systems.

Fig. 1 is a view of the base of the earthed-system box; fig. 2 shows the three sections of the moulded box; and fig. 3 illustrates the box used as a ceiling rose.

Some Contracting Industry Figures.

According to Ministry of Labour records there are 14,200 men and 1,300 women, a total of 15,500 people, engaged in the electrical wiring and contracting industry. Of these 1,130 or 7.3 per cent. were unemployed on May 27th, 1929.

The last annual report of the Executive Committee of the National Register of Electrical Installation Contractors showed that at April 5th, 1929, the number of contractors on the Register was 1,202. The last Year Book of the Electrical Contractors' Association indicated that of the membership of about 1,100 in July, 1928, approximately 650 were registered

Installation Licences in Australia.

The Sydney *Daily Guardian* states that sweeping reforms in connection with the licensing of electrical contractors and electricians in New South Wales are to come into force on July 4th. On that date the newly appointed Licensing Board will bring into force the provisions of the Act passed by Parliament last session. Thereafter a person holding an electrician's licence will be prohibited from carrying out installation work on other than his own premises, except as the employé of a licensed electrical contractor. No electrical installation may be made by an unlicensed person except under the strictest supervision of a licence-holder. All persons, firms, or companies who contract for electrical installation work must be licensed: where the contractor does not personally do the work he must employ constantly on the job until it is finished at least one licensed electrician. Faulty electrical installations will carry a severe penalty, and licences may be suspended or cancelled for other breaches.

The Board was to hold an examination in June for candidates for licences, and licences were to be issued to successful candidates employed in the trade upon production of satisfactory evidence of their experience.

"Ourselves Alone."

In a recent issue of *Electrical Contracting* (Chicago) the American Association of Electragists (contractor-dealers) was urged:—(1) To withdraw from all electrical industry alliances and industry conference work and devote all of its time, money and energy to the interests of its members only; (2) To tackle one or two problems of the electrical contractor each year and let nothing prevent it from finishing those problems; (3) To set apart a certain large amount of its time and money for the purpose of helping local chapters to organise in a way that will be of real benefit to the members; and (4) To require the staff and officers "to make more contact with members to the end that members, by a better understanding of the work and policies of this national body, become proud of membership."

A Faked "Earth" Connection.

The same periodical reports that an electrical contractor of Louisville, Kentucky, has been fined $10 each in five cases of faking "ground" connections. He was indicted in nine cases, but four were dismissed. The Louisville ordinance requires that the system grounding conductor be enclosed in conduit for protection. This conduit, if rigidly connected to service switch box or service pipe and bonded to water pipe, may also serve as conductor grounding equipment. The contractor in question ran the ground pipe in the usual way, from switch box to the water pipe, but instead of pulling the No. 8 system grounding conductor through the conduit, he removed the insulation from short pieces of wire and stuck them in each end of the pipe. Then, to get contact for the inspector's test, he placed small wooden plugs in the pipe to hold the wire against the conduit.

Defective Equipment in New York.

In a re-inspection of buildings during 1928 the New York Board of Fire Underwriters examined installations in 4,970 buildings, including 18,489 "equipments." Of the latter, 10,368, or 56 per cent., were found defective; in 5,777 cases the defects were subsequently corrected.

Contractor Licensing Bill Rejected.

The Montana (United States) Legislature recently rejected a Bill providing for the licensing of electrical contractors and the setting up of a State board of examiners to adjudge the fitness of contractors to hold licences.

Apprentices' Classes at Hull.

In Hull the electrical contractors have made special arrangements with the Education Committee for classes for their apprentices. The fees are to be paid by the contractors and the classes will occupy part of the working day.

The National Physical Laboratory.

An account of the annual inspection by the General Board and some details of the new extra-high-voltage section of the laboratory.

THE annual inspection of the National Physical Laboratory by the General Board took place on June 18th. Favoured with fine weather, as this function, which is assuming somewhat of a social character, invariably is, the number of visitors invited is growing larger each year. They were received by Sir Ernest Rutherford, president of the Royal Society and chairman of the Board; Sir Richard Glazebrook, chairman of the Executive Committee; and Sir Joseph E. Petavel, director of the laboratory. Tea was served as usual in the aerodynamics building.

Of the numerous departments inspected, chief interest centred this year in the new extra-high-pressure section of the laboratory, which is considered to be in certain respects unique, and should prove to be invaluable for dealing with a number of problems of immediate urgency to the electrical industry of the country, particularly in relation to the new national electricity scheme, in which a voltage of 132 kV will be generally used, and for some purposes even higher voltages.

The high-voltage laboratory is a separate building with a large hall of about 120 by 60 sq. ft. floor area, and 44½ ft.

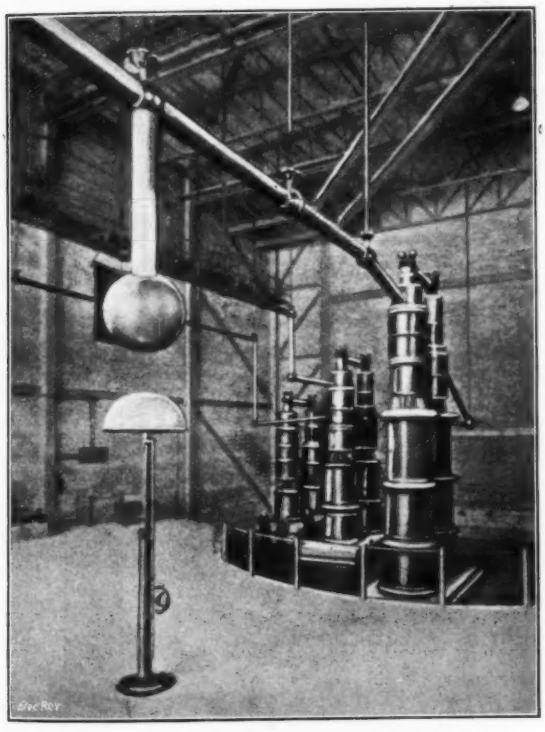


Fig. 1.—Extra-high-voltage Transformers.

high, containing the high-voltage transformers in a pit at one end about 7 ft. deep. At the other end of the building there is a doorway 35 ft. high and 35 ft. wide, through which high-voltage conductors can be taken into the open. On one side of the building are three windows, each 10 ft. square, with their centres 23 ft. above floor level, also for carrying high-voltage conductors out into the open. On the other side of the large hall there is a range of smaller rooms, 16 ft. high, on two floors; their total length is about 134 ft. On the ground floor is the room for the power plant, 53 ft. by 21 ft., arranged to be close to the transformers. It is equipped with a 5-ton hand-operated travelling crane. Next to the staircase at the other end is the control room, with a large glass partition, some sections of which can be opened, separating it from the large transformer hall. From a 35-ft. level on the staircase a door opens on to a gallery, 3 ft. wide, supported on the wall of the hall, from which a view of the transformer plant and the apparatus under test can be obtained from above.

The high-voltage transformers were supplied by Messrs. Ferranti, Ltd., to the design of Messrs. E. Haefely & Co., of Bâle, Switzerland, who constructed certain parts. The main qualities considered in choosing the type of transformer were flexibility and adaptability for various research purposes and for facilitating the carrying out of accurate measurements, while providing adequate power over a wide range of voltage. The air-cooled type was chosen chiefly because it enables connections to be made to a number of points along the secondary winding, to which electric shielding devices can be connected, such as are necessary for use with resistances required for the measurement of power, phase angle, voltage, &c., at high voltages. The importance of being able to obtain 3-phase high pressures led to the choice of three transformers of similar electro-magnetic characteristics, while to obtain the highest single-phase voltage available, given three such transformers, it was necessary that they should be capable of operating in cascade connection.

The nominal output decided upon was 500 kVA at a million volts, the current being 0.5 A, to obtain which the three transformers are each rated at 375 kV. The primary voltage chosen depended to some extent on the easier construction of a winding for 500 A at 1,000 V than for 1,000 A at 500 V, on account of the greater flexibility of the conductor and the smaller current. The three transformers can be used in parallel. Their secondary windings are in two halves, which can be put in parallel, enabling the full nominal output of each transformer to be obtained at 187 kV.

The transformers are on insulating stands (figs. 1 and 2) in the form of varnished-paper cylinders, which increase in height to correspond with the increase in voltage to earth when they are in cascade connection. The transformer of the highest voltage is of a total height of 33 ft., including the stand; the stand weighs 5 tons and the transformer 9 tons. The transformers are arranged at successively increasing distances from the walls, with suitable isolating switches for the primary circuits having subsidiary isolating links in series with them.

A travelling electric crane of 3 tons capacity runs on a girder fixed to the underside of the roof principals. It divides over the pit into two branches, so placed that a direct lift can be obtained over the two vertical limbs of each transformer. The control switch and regulator are connected by flexible cables and sockets to permanent underground wiring, and are situated close to the edge of the pit in such a position that the operator has a good view of the transformers and over the floor of the building generally. The regulating apparatus is portable and can be removed if required, covers being provided for the ends of the underground connections. The crane system circuit is earthed when the high-voltage plant is in use, the traversing and lifting regulators being left "on" to ensure that the crane and the nine conductor rails feeding it cannot attain a high voltage to earth by induction or otherwise.

As regards the mode of operation, when the transformers are in cascade connection the primary circuit is supplied from the power plant at any pressure up to 1,000 V. One pole of the supply and one end of the secondary winding of No. 1 transformer are earthed. The voltage builds up to 187.5 kV along one vertical set of secondary coils, downwards, and at the bottom of the set the winding is connected to the transformer core, which is maintained at the mean voltage of the winding, so that the insulation is not subjected to more than half the voltage generated by the transformer. The other half of the secondary builds up from 187.5 to 375 kV. The second transformer is fed from this 375 kV point and from another point on the winding of the first transformer 125 kV below it, *i.e.*, 250 kV above earth. The corresponding points on the winding of the second transformer are connected to these, but inverted, so that the voltage builds up backwards as compared with No. 1. What is normally the primary circuit of No. 2 transformer, which is connected to one end of the secondary winding, thus acquires a voltage of 625 kV above earth. Between transformers 2 and 3 the 1,000-V primary windings are used as the transfer circuit, so that the third transformer adds its rated voltage of 375 kV, making 1,000 kV. Neglecting the losses in the transformers, for an output of 500 kVA, corresponding to 0.5 A at 1,000 kV, the input to No. 1 transformer is 500 A at 1,000 volts. The output from No. 1 supplied to Nos. 2 and 3 is 375 kVA. This is supplied at 125 kV, so that the transfer current between transformers 1 and 2 is 3 A. The transfer between transformers 2 and 3 is 187.5 kVA at 1,000 V, the corresponding current being 187.5 A. Fig. 3 is a reproduced photograph of a million-volt spark obtained from the N.P.L. plant.

Transformers of the air-insulated type for unusually high voltages can hardly be designed on ordinary lines without considerable magnetic leakage, the effect of which is enhanced when they are used in cascade. To reduce this a compensating winding is employed, the principal section of which surrounds the core in the neighbourhood of the main primary

winding, and to it are connected other coils in parallel, so placed as to assist in compensating for the magnetic leakage which would otherwise occur. The convenient place for the compensating winding is close to the core, and, in order to fix its potential, it is definitely connected to the core at one point. The nominal voltage of the winding can have any desired value within reasonable limits, its function being to deal with a definite number of ampere-turns. It was thought desirable to choose 1,000 volts for the purpose, corresponding to the voltage of the generatjng plant. The compensating winding can then be used as the main primary circuit, allowing an additional degree of flexibility in the operation of the transformers.

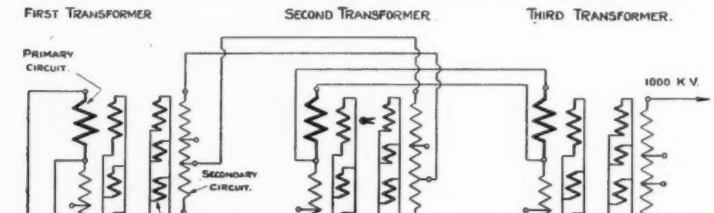


Fig. 2.—Cascade Transformer Connections for One Million Volts.

The regulation of the voltage of the transformers is effected by variation of the field current of the alternators supplying them. In order to obtain low voltages without working the magnetic field of the alternators at an inconveniently low value, when instability might arise, intermediate auto-transformers can be inserted and so arranged as to give 0.5, 0.25, 0.15, 0.10, or 0.05 of the applied voltage at the various tappings, 187.5 kVA being available from each at 500 volts, and less in proportion at the lower voltages. To enable the transformers to be used in different circuits and in different combinations, six connecting mains for their primary circuits are available from the power room. The circuits are of bare copper rod, rated at 500 A, supported on porcelain insulators sufficiently high on the wall to be out of reach.

The generating plant, which was designed and constructed by the British Thomson-Houston Co., Ltd., consists of two alternators, each rated at 350 kVA, single-phase, at 0.3 power factor, each having eight poles, giving a frequency of 50 cycles per second at 750 r.p.m. They form the centre pair of four machines coupled together, of which the end two are the motors. Two generators of 350 kVA each were chosen, in preference to one machine of double this value, so as to give two sources of supply having any desired voltage ratio and phase relation. The rated output is available at 50 cycles over a range of voltage from 800 to 1,200. The phase adjustment is achieved by rotating the stator of one of the generators (which is mounted on rollers) by means of a motor and worm and screw gear; this operation can be carried out from the control station. Particular attention has been given to the wave form of the alternators, which gave excellent results when tested for sinusoidal perfection of wave form by very sensitive instruments.

The control room on the ground floor has a clear view over the main floor of the transformer hall through a glass partition 15 ft. high. The chief operator has on his right a small push-button panel, by which he starts and stops the motors of the main generating plant, using either or both of the two motors at will. The connections of the starting resistances of the motors are operated by contactor switches, which automatically cut out sections of the resistance as the speed increases. There are also push buttons which operate the trip mechanism of the main switches. Close at hand are also a set of four small switches by which, through relays, the control room and main hall can be put in darkness. One of the lighting circuits in the hall is operated through an automatic dimmer, so that any person in the hall has about 10 seconds warning before it becomes completely dark. On the vertical front of the desk are hand wheels for operating the coarse and fine resistances in the fields of the main driving motors. The speed is indicated by an electrically-operated instrument made by Messrs. Evershed & Vignoles, Ltd., consisting of a permanent-magnet dynamo driven by a belt from the shaft of the generator plant, the indicator being a voltmeter graduated in revolutions per minute. For the more accurate adjustment of speed to a definite frequency, such as 50 cycles per second, a stroboscopic method is used.

On the left side of the control desk are the instruments which show the voltages and current in the circuits in use and indicate the positions of the switches in the power room. There is also a multiple-circuit telephone at hand with connections to the power room, the transformer pit, the far side of the main floor, and the gallery. In the control room also is a set of electrostatic precision instruments with large circular scales, consisting of voltmeters and a wattmeter with their switches and calibrating resistances.

The equipment, including the three main transformers of 1,000/375,000 volts each that are rated at 500 kVA and capable of delivering 1,000,000 volts when connected in cascade, fig. 2, has been in use for testing purposes for about six months. Provision is being made for water resistivity conditioning plant (10,000 ohms per c.c. has been agreed upon internationally) for testing insulators under artificial rain, and also under oil up to a temperature of 100 deg. C.

Some of the apparatus on view, more particularly a large high-voltage air condenser and a shielded water-tube resistor, have been developed and used for research on dielectric losses, particularly in power transmission cables up to 150,000 volts; this work is in progress for the Electrical Research Association. Visitors saw a demonstration of the effect of a rotating electric field on certain types of insulation. A rotating field was produced in the space between three similar conductors spaced at the corners of an equilateral triangle when they were connected to a three-phase supply. Three spheres placed a few diameters apart formed a convenient system of conductors, a foot in diameter, and the speed of rotation of the field was 50 revolutions a second. When insulating material is placed in a rotating field, one effect of dielectric absorption is that a mechanical force acts on it, tending to drag it in the direction of rotation of the field. Materials containing small amounts of moisture frequently show considerable absorption effects and, as there is normally a certain amount of water in paper, a cylinder of paper a foot in diameter was made to rotate in the manner indicated when the three spheres were connected to a three-phase supply of about 300,000 volts, the speed of rotation of the cylinder being one or two hundred revolutions a minute.

The arcs formed between three points connected to a three-phase supply may take the form of a triangle, or they may join together and form a Y: three-phase arcs at about 400,000 volts were also shown, arranged vertically so as to be more easily visible.

Whilst space limitation does not permit of reference to all the investigations that are being carried out, some of the activities of the wireless division of the Electricity Department may be noted. For instance, when the overall sensitivity of a wireless receiver is to be measured, the set is placed in a room which is specially screened from external disturbance by having its walls, floor, and ceiling covered with small-mesh wire netting. Measurements made inside the room have shown that on broadcast wave-lengths the strength of field of wireless waves is reduced to about 5 per cent. of the value of the field outside the room. In an adjoining room the valve oscillators which supply the necessary current for the test are contained inside a cabin which is entirely screened with tinned iron sheet. In this case it is necessary to obtain much more perfect screening than is possible with wire netting.

Fig. 3.—Million-volt Flash-over.

This screened cabin is provided with a trap-door entrance closed by a mercury seal, and in view of the air-tight nature of the cabin, special arrangements have been made to ensure adequate forced ventilation. The ventilating tubes are of special design to permit the flow of air and prevent the passage of electric waves, the circulation of the air being obtained by means of a small rotary pump.

The true rendering of speech and music in wireless reception depends in no small measure upon the design and choice of the components used to amplify up to loud-speaker strength the small rectified voltages provided by the high-frequency and detector stages of a receiver. Advances in the design of intervalve transformers and other coupling arrangements have resulted from accurate measurements of the amplification made at a number of telephone frequencies throughout the range of audibility. The apparatus developed at the Laboratory for this purpose is believed to be of high accuracy and of great flexibility. The method of measurement used consists in providing a small voltage by means of the potential difference across a low resistance through which an alternating current of known and adjustable frequency passes. The same current provides a much larger variable potential difference by flowing through a variable resistance and the primary winding of a variable mutual inductance. From the resistance and mutual inductance combination, a voltage of any magnitude and phase angle within the compass of the apparatus may be obtained. If, now, the small fixed voltage first referred to is applied to the valve amplifier, it can be so arranged that the resulting large voltage given by the amplifier is just balanced by the variable large voltage. The known ratio of the two voltages thus gives a direct measure of the amplification of the amplifier. From measurements made over a range of frequency from 25 to 6,000 cycles per second, a curve may be drawn which shows immediately the quality of the amplifier. In an ideal case, the curve is a horizontal straight line, indicating constant amplification.

In the main wireless hut the valuable application of wireless to navigation was illustrated by a portable radio compass, or direction-finder. The instrument exhibited has been especially built for field observation work, and particular attention has been paid to portability, accuracy, sensitivity, and wide range of working wave-lengths. It uses a supersonic heterodyne seven-valve receiver, and has a working wave-length range of from 30 to 4,000 metres, to cover which range two separate frame coils are employed, and the receiver is entirely self-contained in a screened box.

For use in experimental work with direction-finders, and also for field strength measurements, it is convenient to have a self-contained portable transmitter; the particular model shown was a two-valve arrangement having a working range of from 30 to 2,000 metres. The whole transmitter is operated from a 12-volt accumulator, a suitable machine being incorporated in the set to generate the necessary current at the high voltage of 600. The maximum power input is of the order of 50 watts, which, in favourable circumstances, gives an available range for measurements of about 50 miles.

Apparatus was shown for the transmission and reception of very short waves (1.5 to 15 metres) which is being used in the study of the technique of wireless wave propagation. For certain purposes, *e.g.*, the adjustment of a receiving set to a known wave-length, it is convenient to have a small portable generator, or heterodyne wave-meter, capable of producing modulated waves which can be heard in telephones after rectification, without requiring a separate heterodyne generator. Several models of such a generator, operating on various ranges between the limits of 4 and 20,000 metres, were shown.

The accompanying illustrations have been reproduced from the National Physical Laboratory Report for the year 1928, which was abstracted in the ELECTRICAL REVIEW, May 3rd, p. 805, and May 10th, p. 848, by the permission of the Controller of H.M. Stationery Office.

Nottingham's New Council Buildings.

An example of the advantages of co-operative design and craftsmanship, and resource of the architect, decorative artist, and illumination engineer.

THE regret of Nottingham's citizens at the change in the character of the great old Market Square, which the Corporation's plans necessitated, has merged into pride of their new Council House and Exchange, which was officially opened by the Prince of Wales last month.

Designed by Mr. T. Cecil Howitt, the buildings have taken two years to complete, a fitting home of civic government and a symbol of prosperity. The dignity of the marble entrance hall on the ground floor and the grand staircase, fig. 3, is much enhanced at night by an arrangement of "Gecoray" reflectors, fitted with flame-sprayed "Osram" lamps, sunk in an invisible cornice round the periphery of the base of the dome. Round the dome itself in circles are six graduated tiers of 24 windows, each fitted with specially prepared glass of amber tint that is deeper in the lower tiers, and gradually fades to clear transparency in the windows at the eye of the dome. The light from the cornice is reinforced by an additional set of 15 flood reflector lamps at various corners in the girders outside the dome.

Fig. 1.—High-pressure Sub-station Switchgear.

On the first and third floors are a series of reception, dining, ante and sitting rooms, and the library for the use of members of the City Council. They have their particular schemes of interior decoration and lighting; for instance, in the members' room and library a shadowless glow is obtained from no less than 385 lamps in a series of specially-designed trough reflectors set in the concealed cornice, sunk in the interval between the top of the panelling and the curve of the ceiling. In the dining room, which will accommodate 100 guests, the selected scheme of illuminating the fine plaster and panelling to produce the specific effect demanded by the architect has been well achieved by the use of 144 reflectors equipped with "Pearl" lamps and disposed within the sunk cornice, the indirect illumination being without shadow of any kind, or glare.

In an ante-room on the same floor the panelling and furniture are well defined by 384 lamps in trough reflectors of special contour arranged in the cornice and concealed behind the panelling, while the fireplace is flanked on either side by two 6-ft. handsome silver standards, each containing six lamps, and in the centre of the room is an octagonal table with four "Pearl" lamps concealed beneath an ornamental panel in the centre.

The new Council Chamber on the third floor, considering the size of the building as a whole, appears to be comparatively small for the special reason that, after allowing ample seating accommodation, the volume was kept to a minimum to reduce acoustic difficulties. The floor is heavily carpeted, and the wall panels are made of thickly padded quilt, exactly matching the colour of the woodwork, so that at first sight the two materials are indistinguishable. A series of graduated ceiling panels culminates in a large semi-circular lay-light, through which daylight is admitted to the room. In order to intensify the light reflected from the cornice, the ceiling is cone-finished

next to the walls, and evenly diffused uniform illumination is thereby obtained; 224 reflectors are used, each containing a "Pearl" lamp, disposed along the whole length of the semi-circular cornice, concealed behind the top of the panelling. As will be seen in fig. 2, light is reflected into every corner of the chamber.

Fig. 2.—The Council Chamber.

The two division lobbies outside the Council Chamber have dome-shaped ceilings, and lend themselves to brilliant illumination, each being lighted by 40 "Striplite" fittings concealed in a sunken cornice on a similar principle to that employed in the other rooms already described. All the corridors on the second, third, and fourth floors, the kitchens, service rooms, lavatories, and auxiliary staircases, are lighted no less efficiently with adaptations of the standard "Unalux" three-lamp fittings, the metal work being of solid chased bronze.

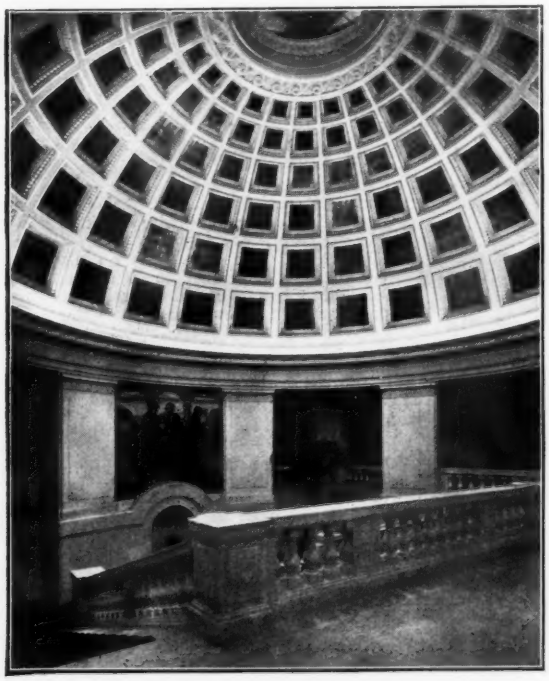


Fig. 3.—Illuminated Staircase Dome.

The floodlighting of Exchange Row, fig. 4, the name given to the arcade which runs between the two wings at the rear of the main front block, calls for comment. This new shopping way is T-shaped in form, wide, and of unusually lofty dimensions; the barrel roofs are 60 ft. high, and at their intersection form the main dome feature with an inner dome rising 90 ft. above the pavement. The illumination of the shops will supplement the floodlighting by 68 reflectors concealed behind the tall Greek vases arranged on each side of the arcade along the projecting masonry above the shop facias. The reflectors have been intentionally fitted with lamps of only a moderate wattage, in order to give a more subdued tone, thereby obviating any suggestion of competition with the necessarily greater degree of brilliancy required in the lighting of the shop windows. In order to accentuate the colouring of the four frescoes painted between the supporting arches of the dome, batteries of reflectors are disposed below the frescoes.

The artificial lighting of the new Council House, one of the largest public buildings in the kingdom, is yet another proof of the progress that has been made in the adequate illumination of such buildings, and the gratifying results which the architect and the Illuminating Engineering Department of the General Electric Co., Ltd., have achieved entitle them to congratulation. The task of the electrical contractors, Messrs. W. J. Furse & Co., Ltd., of Nottingham, who carried out the whole of the electrical installation, was one of magnitude and difficulty.

The switchgear for controlling the electricity supplied to the Exchange buildings has been supplied by Messrs. A. Reyrolle & Co., Ltd. It is of their well-known metal-clad horizontal draw-out type, and is situated in a sub-station in the basement. There are two boards, one of seven panels for 6,600-volt, 3-phase working, and the other of 15 panels for 400-volt, 3-phase, 4-wire working. The former, fig. 1, consists of two incoming feeder panels with a capacity of 300 amperes, four transformer panels of the same capacity, and one bus-bar section panel. The feeder panels and section panel have inverse time-limit overload and earth leakage protection, and the transformer panels inverse time-limit overload and Merz-Price protection. The l.p. board consists of ten 400-ampere feeder panels with inverse time-limit overload protection, one 2,000-ampere section panel, and four 1,000-ampere transformer panels with time-limit overload and Merz-Price protection.

An interesting method has been adopted for connecting the transformers to the l.p. switchgear. The transformer room is immediately behind the switch room, and special cable boxes have been fitted to the l.p. gear and shaped so that they project through the dividing wall into the transformer room,

Fig. 4.—Exchange Row Shopping Arcade.

cables have then been taken from the transformers straight to the boxes.

The lighting arrangements throughout the building are an example of the many advantages of close co-operation between the skill of the architect, the craftsmanship of the decorative artist, and the science and resource of the lighting expert, of which the citizens of Nottingham may well be proud.

Domestic Electrical Developments.

New Cooking, Heating, and Cleaning Devices for use in the Home.

A Baking Oven.

The accompanying illustration, fig. 1, is of the "Onward" electric oven recently introduced by Messrs. Edwin Chambers, Ltd., Onward Works, Leeds Road, Bradford. It is made in two standard sizes for working at 230 V. The smaller model

Fig. 1.—The "Onward" Oven.

has inside dimensions of 12 in. by 12 in. by 9 in., and a loading of 1,000 W. The other oven is loaded at 2,000 W, and the internal measurements are 14 in. by 14 in. by 12 in. Three-heat control is provided for the larger oven. Both models are complete with two oven shelves and a grid. The ovens may be supplied with or without the stand.

New Domestic Supply Charges.

A somewhat drastic departure from the usual method of charging for electrical energy used for domestic purposes is represented by the "domestic tariff" recently adopted by the NEWCASTLE-UPON-TYNE ELECTRIC SUPPLY CO., LTD. The outstanding points are that the "two-part" principle is eliminated, or at any rate apparently so as far as the consumer is concerned, and in its place a sliding-scale system is adopted. The following table is self-explanatory of the new system:—

Number of Assessable Rooms.	Units per quarter at 6½d. per unit. Winter qrs.	Summer qrs.	Next Units per quarter at 3½d. per unit. Winter qrs.	Summer qrs.	Next Units per quarter at 1d. per unit. Winter qrs.	Summer qrs.
4 or less	32	16	26	13	500	250
5	38	19	30	15	550	275
6	50	25	40	20	600	300
7	64	32	52	26	650	325
8	82	41	66	33	700	350
9	102	51	82	41	750	375
10	122	61	98	49	750	375
11	142	71	114	57	750	375
12	162	81	130	65	750	375
13	182	91	146	73	750	375
14	202	101	162	81	750	375
15	222	111	178	89	750	375

All energy consumed in excess of that shown under 1d. per unit is charged for at ¾d. per unit.

By "assessable rooms" is meant all rooms which may be broadly classed as living rooms.

A Luncheon Club's Electric Kitchen.

Some interesting particulars are given in *Electrics* of the electric cooking installation at the kitchen at Ergon House, the headquarters of the London Power Co., Ltd. The cooking equipment was supplied by the JACKSON ELECTRIC STOVE CO., LTD. It includes a No. 9 double-oven range fitted with side elements and equipped with an illuminated switchboard. Three-heat control is provided, and the loading of each oven is 4½ kW. There is also a No. 24D cooker, with two standard ovens loaded at 2.7 kW. The whole is surmounted by a cast-iron hob containing five hotplates and one grill, the top of the grill being available as a simmering or boiling plate. Three-heat regulation on all of the above sections is provided. Over the hob, mounted on two cast-iron brackets, are two No. 260-type hot cupboards, the space between the bottom of the hot cupboards and the top of the hob being filled in with a tiled-pattern splash plate. Each hot cupboard is controlled by a s.p. rotary indicating switch. The total loading of this cooker is 19.1 kW. A four-plate boiling table fitted with a circular 12-in. boiling plate of the "Sadia" pattern is also installed. The loading of each plate is 2.7 kW. An illuminated switchboard is also fitted to this equipment. A fish fryer measuring 18 in. by 18 in. is another feature. The loading of this appliance is 5.75 kW, and it is arranged for various degrees of heat regulation. The heating elements are not attached to the pan in any way, so that the latter may be totally immersed in boiling water for cleaning purposes. There is also a No. 283 hot cupboard with sliding doors. The top of the hot cupboard is arranged with two carving wells and a Bain Marie or water bath. The loading for this hot cupboard is 7.14 kW. A "Frigidaire" electric refrigerator serves for the necessary food storage. The whole of the hot-water supply for the kitchen is provided by two 25-gallon calorifiers with a total loading of 12 kW, each tank being fitted with thermostatic control. The installation provides 100 lunches daily.

A New Electric Oven.

The new model-124 electric oven has recently been introduced by the ARORA CO., Loughborough, to compete with the Continental and American ovens which are being sold in increasing quantities in this country. It has been designed on thoroughly practical lines, giving a clear internal cooking space of 14 in. wide by 15 in. high by 13 in. back to front. The special feature is the introduction of iron tubular heaters, the electrical elements of which are totally-enclosed; in fact, the whole of the interior may be swilled out with water without the slightest risk of shock. Another feature is that the oven is heavily packed for economical running costs; the heating tubes are entered from the back, and two are placed normally on each side at the bottom, but provision is made for two extra tubes at the top when desired.

Fig. 2.—"Arora" Cooking Outfit, including New 124 Oven.

The removable electrical elements are supported throughout on refractory insulating material in 3-in. interlocking sections, enabling any length of heater to be built up. All connections are external to the outer walls of the oven, and in spite of the low loading a well-designed British-made

3-heat rotary switch of 9-A capacity is included. The standard size and the standard loading offered have been specially designed to meet the requirements of modern housing schemes. Each heating tube is loaded at 375 watts. On maximum loading a temperature of 400 deg. F. is attained in 40 minutes. The accompanying illustration, fig. 2, shows a complete "Arora" cooking equipment, comprising the No. 124 oven, with a 15-in. stand, and a No. 104 boiling plate and grill.

Portable Meter Box-Seats.

Referring to the equipment recently introduced by the Brompton and Kensington Electricity Supply Co., Ltd., which was described under the above heading in our issue of May 31st, p. 987, we learn from A.E.G. ELECTRIC CO., LTD., 131, Victoria Street, S.W.1, that they have patented a zero-resetting device for use with meters used in hotels, &c., for electric fires. By such means a guest is prevented from having the benefit of the coin inserted by his predecessor. Incidentally, the hotel proprietor pockets the leavings.

A New Vacuum Cleaner.

We have received from Messrs. L. BENN & CO., LTD., the following particulars of the "Demon" electric vacuum cleaner, fig. 3, for which they are the world concessionaires. The exposed metal parts are heavily nickel-plated, highly polished and guaranteed not to discolour. The body is covered with an attractive imitation leather jacket of maroon, and a handle is provided to carry the machine from room to room. It weighs only 7 lb., is well-balanced and very compact in design. Gliders are fitted in place of wheels. The dust bag is invisible to the eye and will hold several pounds of dust. A special tag is provided for emptying, so that the hands cannot be soiled. Specially-designed steel clasps hold the dust bag to the body of the cleaner, and they are so fitted that they

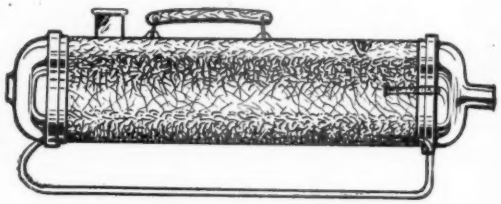


Fig. 3.—The "Demon" Vacuum Cleaner.

cannot snap. There is an adequate length of silk flex, together with a standard power plug and switch. A Universal motor, suitable for either d.c. or a.c., is used, and a modern fitting eliminates the need for oiling. The loading of the motor is about 180 W.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this Section.

Flexible-wire Grip for Wall Plugs.

In a new range of B.E.S.A. 3-pin plugs which have been introduced by Messrs. JULIUS SAX & CO., LTD., 27, Lower Mall, Hammersmith, W.6, is incorporated what is claimed to be a very effective flexible-wire grip. As depicted in fig. 1, the

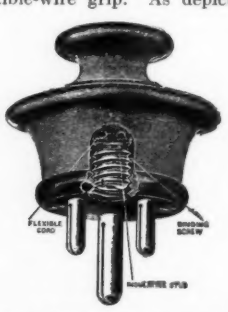


Fig. 1.—"Julius Sax" Plug, showing Cord-grip Arrangements.

arrangement is simple and consists merely of a binding screw threaded through the fibre base of the plug, so that a flexible cord of small or large diameter can be "cord gripped" between the point of the screw and the interior of the top of the plug. An insulating stud forms the gripping surface at the point of the screw. The plug pins and socket tubes are of the solid types, and together ensure, it is claimed, the maximum amount of contact possible, without overheating.

A Paint-spraying Set.

Messrs. L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, Kingsway, W.C.2, have recently introduced a new model of "Sprayit Electrically," which, it is claimed, embodies a positive agitation of the materials in the container. The equipment consists of two separate essential parts, the compressor unit, and the agitator gun and container, with the necessary connections. The small rotary motor compressor unit weighs only 5 lb., and is capable, it is claimed, of producing a constant pressure of 25 to 30 lb. per sq. in., which pressure is stepped up by a specially designed fluid tube and nozzle assembly. The agitator-type gun weighs 1 lb., and is equipped with an instantaneous air control. By merely changing the nozzles the spray can be regulated from a ¼-in. strip to a 7-in. band. The loading of the motor is under 200 W.

An Improved Indicator.

The "Bardisk" indicator, fig. 2, which has been recently introduced by Messrs. S. TAYLOR & SONS, LTD., 38a, St. Martin's Lane, W.C.2, relies for its action on the flywheel effect of a heavy dial, with the result that it is unaffected, it is claimed, by external shocks and can be made very robust. The dial consists of a brass disk, 2 in. in diameter, mounted on a steel axle, with a soft-iron roller arm attached near the periphery. The frame of the indicator is made of soft iron, lead coated, and in it are mounted symmetrically side by side two electro-magnets; aboye the magnets is fixed a rocker lever carrying two armatures, so that when one armature rests on one electro-magnet, the other leaves a gap of about ⅛ in. The disk is mounted in the frame, so that the movement of the arm of the disk is through the arc above the rocker lever, and the arc in this case is arranged to be 90 deg. The front bearing for the disk is provided by a narrow bar, fixed to the main frame, top and bottom, which also serves to conceal the black indicating bar in the "off" position. The roller arm, being an unbalanced weight on the disk, comes to rest, under gravity, on one of the two armatures. When a current passes through the electro-magnet opposite to that on which the arm rests, the armature closes with a snap, thereby causing the other armature, on which the arm rests, to move suddenly upwards, giving an impulse to the disk, which absorbs the energy like a flywheel, and so continues to revolve through the arc when the arm reaches the other armature; it is then magnetically held down by the electro-magnet, so preventing

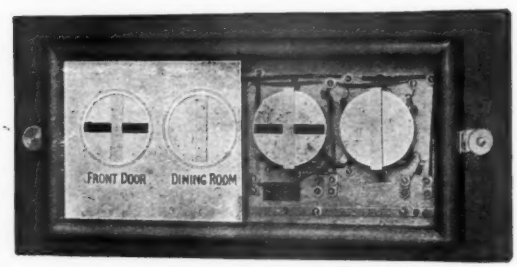


Fig. 2.—The "Bardisk" Bell Indicator.

any rebound of the disk. The replacement is effected by passing a current through the other electro-magnet in a similar manner.

A New Lamp Lock.

The accompanying illustration, fig. 3, shows a new type of "Lamlok" ring which has been introduced by LAMLOK, LTD., 163, Vivian Avenue, Wembley, Middlesex, for dealing with H.O. lampholders, and its application to a bakelite holder. The pins of the lamp register into two "beds" or recesses formed in the ring. The lamp is inserted into the holder in the usual manner, and by screwing up the screw which is tapped into

the boss on the ring, a tilting action is brought about round the pins of the lamp, one side of the ring being raised, while the other side is depressed. In this manner any movement of the ring is restrained, and the lamps are securely locked in the

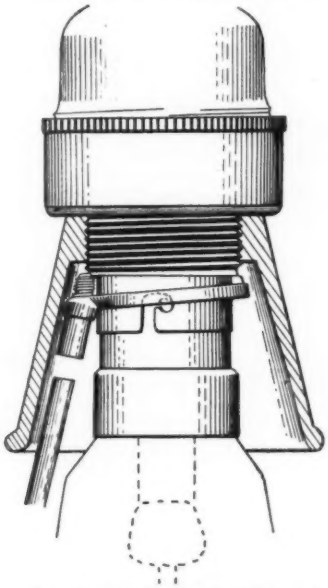


Fig. 3.—Action of "Lamlok" Ring for H.O. Holders.

holder. No damage, it is claimed, is done to the lamp, which can be removed at will by any authorised person using the standard Lamlok key.

Bakelite Lighting-fittings Accessories.

Among recent additions to the wide range of lighting pendants of the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, are a number of fittings incorporating bakelite accessories. In these, bakelite ceiling roses, galleries, and lampholders take the place of the more common form of porcelain roses and metal galleries and holders. The new accessories are of high-class finish, and are claimed to be immune from flymarks, tarnishing, and discolouring; moreover, they are practically shockproof. They are supplied in lustrous oak finish and will harmonise with any surroundings. G.E.C. bakelite accessories have not hitherto figured as integral parts of lighting fittings suitable for domestic offices, corridors, and the like.

Improved Electric Fans.

In order to anticipate a sudden and heavy demand for electric fans this summer, the BRITISH THOMSON-HOUSTON CO., LTD., Rugby, has prepared large stocks of table or bracket models. These, it is claimed, are of high efficiency, and are capable of operating satisfactorily under the most severe working conditions. The range, it is said, will satisfy every

Fig. 4.—Table-type B.T.-H. Fan.

requirement in the home, office, shop, &c. The fans are manufactured in two patterns—oscillating and non-oscillating. All sizes are arranged to permit of adjustment in a horizontal or vertical plane. They can be converted from the table type, fig. 4, to the bracket type by turning a wing screw with a cone point which registers in a socket in the tongue of the hinge and effects a positive clamp. This construction is claimed to be superior to the form of hinge which depends entirely upon friction. The swivel adjustment provides an equal and easy means of changing the direction of the breeze on the horizontal plane.

Reviews.

The International Aspect of Electrical Communications in the Pacific Area. By L. B. TRIBOLET, Ph.D. Pp. vii+282. London: Humphrey Milford, Oxford University Press. Price 11s. 6d. net.

The study of electrical communications must always be of first-rate importance to this country with its world-wide Empire, but at no time has it been so important as at present. We are just embarking on a new era of world-wide communication, not only in telegraphy, but in telephony and pictures.

Until just after the war this country undoubtedly led the world in communication facilities, and, as Dr. Tribolet says, "London is the cable centre of the world," but he goes on to say that "New York is now the wireless centre of the world." Both statements are no doubt correct at the moment, but the whole aspect of communication is changing so rapidly that it is impossible to look ahead with any degree of certainty.

In reviewing British cable activity in the Far East and in South America, the author has some rather bitter, and we think unmerited, remarks both as to the means employed and the ends aimed at. He says, for example, "The Eastern and the Great Northern Companies secured secret monopoly agreements in China which were aimed against the United States," and he makes several similar statements about our endeavours to develop communication facilities in the Far East and in South America. But anyway, there is plenty of room now, with the new developments, for all countries to share as much as they desire in extending facilities for communication throughout the world. Our own endeavours will continue to be primarily governed, as no doubt will those of the United States, by the needs of commerce and business generally, without interfering with the special interests of any particular country or countries.

The author points out that the United States Government has hitherto followed the policy of breaking up monopolies, and of regulating the development of electrical communications in the international sense, leaving the management to private enterprise; but he adds in a rather surprising footnote: "Perhaps Government ownership will come about 1945 when a good many of the contracts of the Radio Corporation of America with foreign countries expire." Another surprising footnote, from the purely technical point of view, is that, according to some of the U.S. experts, "the principles involved in the use of spark sets have not been developed and tremendous new discoveries may await us in that field."

The book gives an excellent account of the international aspects of electrical communication in South America, China and Japan, as found, not only in formal international agreements, but also in arrangements made by syndicates, corporations, and the like. It is published at a most opportune moment just when we in this country are forming a merger of cables and wireless for Imperial communications, and when the International Telephone and Telegraph Company of America is proposing to purchase the Radio Corporation in order to form a world-wide communication system.

This is a book which should be read by all those who are connected with the development of international communication.

Actinotherapy for General Practitioners. By H. G. FALKNER. Pp. x+152. Illustrated. London: Bailliere, Tindall and Cox. 1927. Price 7s. 6d. net.

This work is divided into twenty-three chapters, of which the first ten deal with natural and artificial sunlight, equipment, dosage and technique, and the remainder with specific applications of the treatment to the various disorders for which it is indicated. The author's observations and recommendations are based on his extensive experience of the application of ultra-violet radiation as a curative agent, and should prove a valuable record to general practitioners (to whom the book is primarily addressed) who contemplate the employment of actinotherapeutic methods in their practices.

The purely medical section is one with which the reviewers are not fully competent to deal, but the first section calls for comment as it seems unfortunate that a medical writer addressing himself to the profession should employ terms and make statements open to most serious criticism.

Without wishing to appear pedantic, the author's persistent use of the word "ray" *in the singular* is highly objectionable, as for example (pp. 8 and 9)—"In 1895 X-ray was discovered by Röntgen" and again, "Ultra-violet ray is a very pleasant treatment." Apart from the fact that this is the kind of language to be expected only from the unqualified advertisers of artificial sunlight clinics, a ray is a purely theoretical conception, of use in connection with calculations and text-book diagrams.

In spite of a statement made by Dr. Falkner in his intro-

duction that "nearly every instrument maker in the kingdom has his own special lamp upon the market, many of which are not suitable for the general practitioner," one may venture to assert that every instrument maker of repute has "lamps" which *are* suitable for general purposes, and that the makers are almost invariably able and most willing to give expert opinions regarding their performance and use.

In his chapter on "Artificial Ultra-Violet" the author states: "An important point in the writer's lamp is that it is so constructed that it can be raised or lowered at will. . . . *It gives the carbon, tungsten, or metallium separately,* and as stated before, it does not necessitate moving the patient." The meaning is obvious enough, but such looseness of expression has surely no place in any serious printed book of the present day.

In his tenth chapter (Technique) Dr. Falkner makes some suggestions to practitioners intending to take up the use of ultra-violet radiation. The third of these reads as follows: "Obtain some knowledge of electricity, if only the rudiments. Very few medical men know anything about electricity."

Apart from such defects as those mentioned, the work may afford useful guidance to the practitioner who is concerned more with the conditions of the human subject amenable to treatment by means of ultra-violet radiation than with the physical theory of the rays themselves or the principles of the equipment wherewith they may be produced.

Kempe's Engineer's Year Book, 1929. 36th Edition. Edited by H. R. KEMPE and W. HANNEFORD SMITH. Pp. 3289+ lxxvii; illustrated. London: Crosby Lockwood & Son. Price 30s.

Again the great bulk of this book has been increased—this time by 120 pages—and the difficulty of seeking information in the three thousand odd pages has therefore been increased. To review the work as a whole is a task for which sufficient time and space cannot be found, and we will confine our attention more particularly to the "Electrical engineering" section, although perhaps as much, if not more, electrical engineering material is "hidden" in the remainder of the work. This section is much the same as in other recent editions, but it is interesting to note that some of the "old" illustrations have been replaced by others representing more up-to-date machines, &c. The criticism that the section "Domestic uses of electricity" is dismissed in under two pages, while one particular firm's well-known wiring system is given about four pages, is worth repeating. The opening chapter of the book has for long been an outstanding feature of the work, and particular attention is drawn to this year's clear and concise resumé of recent developments in the electricity supply industry in the sub-section "Electricity supply."

Sir Joseph Wilson Swan, F.R.S. A memoir by M.E.S. and K.R.S. Pp. 183; plates, 6. London: Ernest Benn, Ltd. Price 7s. 6d. net.

This is a very charming, interesting, and appreciative memoir by two of the children of a great inventor, who, applying very early and continuously through an exceptionally long and active life natural originative inventive genius of an extremely high order, unhelped, or shall we say unhindered, by much scholastic or any university education, largely assisted in revolutionising both photography and electric lighting, both at that time in their infancy, besides making numerous valuable contributions to other practical arts and sciences. Though descended on both sides from families of Scottish descent, Sir Joseph Swan's parents had come south and had settled in the County of Durham about the middle of the eighteenth century, and Sir Joseph himself was born in the year 1828 at Sunderland.

As he himself said in later years, his education was, according to common rule, rather neglected; but he owed much of his true education to that neglect, as he was very much left alone and allowed to roam about and see what he could, while about that time he made his first acquaintance with electrical phenomena, shown to him with an electrical machine by a friend of the family. As to this and his other experiences as a child, and as to his education at a dames' school, the story of his early life in this memoir should itself be studied.

At the early age of twelve we find him apprenticed to a Sunderland firm of druggists, both partners in which died within the first three years of his entering the firm, which freed him to join his friend, John Mawson, in his business of chemist and druggist at Newcastle-on-Tyne, which he did in 1846 when he was a lad of eighteen. Within another ten years Mawson and Swan were making their celebrated photographic collodion, for which there rapidly sprung up a large demand for the wet-collodion process.

About a year later, Mawson, who was Sheriff of Newcastle, perished in an explosion of nitro-glycerine, discovered in a Newcastle stable, and supposed to have been of Fenian origin; so Swan was left to manage his rapidly growing chemical business alone. For the next few years he was largely occupied in developing the carbon permanent process of photographic printing, which he patented in 1864, for the practice of which the present writer held a licence from the Autotype Co., Swan's licensees under his patent, when he—the writer—was still a boy at school. Later, Swan invented the half-tone block for ink printing presses, and later still introduced, about the year 1877, the first commercial gelatino-bromide photographic dry plates of wonderful rapidity. In 1879, Swan patented the first bromide paper, still so much used for photographic printing and enlarging.

Other important inventions due to Swan were the cellular lead plate electric storage battery, which he patented in 1881, and which still survives, and that of cellulose threads, exhibited by him at the Inventions Exhibition in 1885 under the description of artificial silk, which was the progenitor of the enormous manufacture of the similar material which still continues under the same name.

No doubt Swan's chief fame is due to his invention of the carbon-filament incandescent lamp, in the invention of which he anticipated Edison and everyone else, though electrical distribution with lamps, dynamos and batteries all in parallel, at constant potential, was first patented by St. George Lane Fox Pitt. Curiously enough, however, though the carbon lamp was probably the most profitable and most interesting of Swan's inventions from an electrical point of view, and led to other lamps with filaments of different material, it was the most evanescent of his inventions, as carbon lamps are now entirely superseded by those with filaments made of tungsten; while his several photographic inventions, his improvements in storage batteries, and his artificial silk, still continue in use and to fructify.

The memoir gives a very life-like account of a most remarkable and modest personality, whose great success was due to his exceeding patience as well as to his brilliant inventiveness.

A. A. CAMPBELL SWINTON, F.R.S.

Electrical Transmission and Distribution. Vols. V and VI. Edited by R. O. KAPP, B.Sc. Pp. 1,007—1,563; illustrated. London: Sir Isaac Pitman & Sons, Ltd. Price 6s. each volume.

The sub-title of the two volumes of this work under review is "Sub-Station Work," and, broadly speaking, these volumes deal with the theory, construction, operation and maintenance of sub-station machinery, including automatic switchgear. There are no less than nine contributors to these two volumes, and while the engagement of so large a number of writers to deal with the field covered has doubtless ensured that each phase of the same has been treated by a specialist, a compensating disadvantage appears to have arisen in that there is a considerable amount of overlapping, whilst the two volumes, considered as a treatise on sub-station work, are lacking in unity of logical sequence. As examples of the overlapping referred to, we note that the reactance method of the voltage control of synchronous convertors is dealt with by two contributors. Mercury arc rectifiers are referred to in three separate sections, whilst, although automatic sub-stations form the subject matter of a separate section, this matter occupies a considerable amount of space in a previous section dealing with the maintenance and operation of sub-station plant. The method of treatment adopted in some sections of these volumes is in marked contrast to that noticed in previous volumes, in that a distinct theoretical bias is observable. In the section dealing with mercury-arc rectifiers, the theoretical side of the subject is very marked, and there are some formidable integrals which are hardly likely to be of great interest to the majority of the readers of the book. We do not wish our note of the theoretical parts of these volumes to be interpreted as a criticism. They are a useful and instructive supplement to the descriptive matter, although in the section on static transformers there is a tendency to include matter of the conventional a.c. text-book character. Although these volumes will undoubtedly appeal to sub-station engineers and operators, the bad arrangement of the matter contained therein somewhat impairs their utility, and as general works of reference they rank below the previous volumes of the series.

In Vol. V, transformers and rotary converting machinery are dealt with by Dr. S. P. Smith and Dr. M. G. Say. The section dealing with transformers is generally good. The theoretical treatment of converting plant is distinctly useful, but, from a practical and descriptive standpoint, the section dealing with this plant is somewhat meagre. The section by Mr. C. W. Jolley, dealing with mercury-arc rectifiers, is an excellent one, and the theory of these machines is admirably dealt with, whilst the descriptive matter is useful and illuminating. This section will be of particular use to electrical men who have yet to make their acquaintance with the mercury arc rectifier. The final section of Vol. V is contributed by Mr. C. W. Marshall. This deals with the handling, care, and protection of transformers, and, whilst being somewhat sketchy in construction, it contains some useful and practical matter for those concerned in the maintenance of static transformer sub-stations.

The first section of Vol. VI, from the pen of Mr. P. Kemp, is entitled "Alternating Current Sub-Stations." Beyond some discursive descriptive matter relating to modern sub-station lay-outs, this section contains very little which is not treated in logical sequence in other portions of the book. The middle section of this volume deals with testing, maintenance and operation work in sub-stations. Three contributors have collaborated to produce this section, and it is consequently somewhat heterogenous in character. We find, however, much useful and practical matter regarding the testing of switch and protective gear, staff organisation, and operating routine, some very interesting notes on traction supply, a considerable amount of descriptive matter relating to the mercury-arc rectifier which forms a useful supplement to the section dealing

with this subject in the preceding volume; and, finally, a considerable amount of space devoted to the maintenance and inspection of automatic sub-stations. The final section of the volume is entitled "Automatic Sub-Stations," and is generally descriptive of the principles of operation of the gear in such sub-station, and its application to lighting and traction requirements. This section might well have been placed before the one now preceding it.

Annual Tables of Constants, and Numerical Data, Chemical, Physical, Biological and Technological. Edited by Dr. R. ANDUBERT, Ch. de Massacré, Dr. A. BUFFAT, L. DURAND, and Dr. G. FCEX. Illustrated. Paris: Gauthier-Villars and Cie. Price 90 fr.

This book contains certain abstracts from the complete Volume VI (1923-4) of the above-named annual tables.

The abstracts combined here are such as are of special interest to electrical workers, and give, in the form of curves and tables, the most up-to-date data which have been established in all branches of electricity, together with full references to the original sources and sufficient explanatory matter to define the units employed in all cases. The subjects covered are: (1) electricity (electric conductivity, dielectric constants, thermo-electric forces, electric arcs and discharges, losses in insulation, resistance materials, fusing currents, increased resistance to alternating currents, heating of machines; (2) magnetism (in pure metals, in alloys, permanent magnets, magneto striction, para- and dia-magnetism, atomic moments, magneto-chemistry, magneto-optics, &c.); (3) electrochemistry (conductivity of electrolytes, fused salts, ionic conductivity, dissociation constants, primary cells, accumulators, photo-electric cells, contact potentials, decomposition potentials, &c.).

The collection is a valuable one, and contains much that could otherwise only be obtained from the original sources. The explanatory matter is in French.

The index to the 174 pages in the volume is given in French, German, English and Italian, but only occupies some 3½ pages, and is hardly detailed enough for such a work of reference. It might well be supplemented by alphabetical subject and name indexes.

High-speed Circuit-breakers.

Features of the Equipment Recently Introduced by the General Electric Co., Ltd.

A NEW type of high-speed circuit breaker recently developed by the General Electric Co., Ltd., will, it is claimed, clear the worst type of short-circuit in approximately 1/100 second. It is particularly suitable for use with d.c. traction circuits at pressures of 600, 1,500, and 3,300 volts, as well as for other circuits where heavy overloads or short-circuits may occur. It may also be used with automatically-controlled convertors or rectifiers, and operated from remote positions. The breaker may be closed manually, by local and distant electrical control, or by supervisory control. It can be arranged with auto-reclosing features, coupled with protection against persistent overload, while a number of electrical interlocks, carried on the framework, together with suitable relays, control these features. When required the breaker may be mounted on a removable truck, as in fig. 1, with all the necessary plugs and sockets for the main and auxiliary connections.

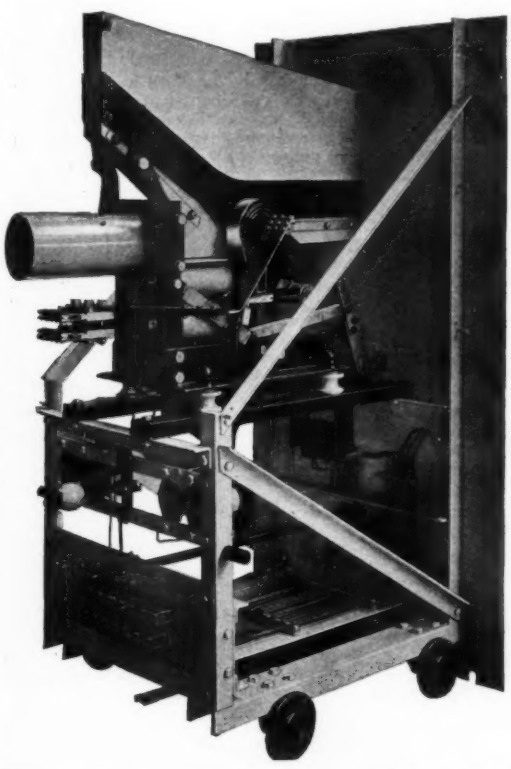
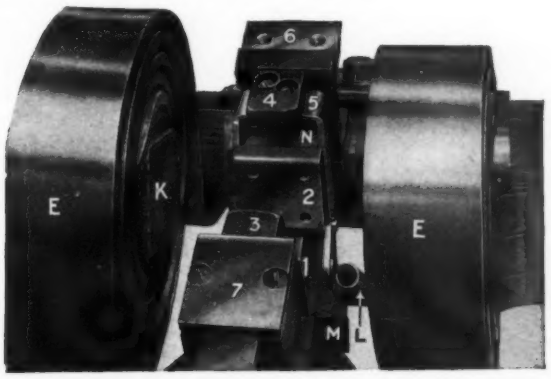


Fig. 1.—Circuit Breaker on Truck Cubicle; 1,500 V.

The construction of the apparatus is depicted in figs. 2 and 3, the former illustration being a close-up view of the contacts.

The moving contact is carried at the top of the duralumin arm controlled by strong springs, the parts being so located that the hold-on armature acts as a fulcrum, through which the pull of the springs is transmitted to the contacts to hold the latter firmly together. Auxiliary contacts are provided which open an instant later than the main contacts, so that there is no arcing on the main contacts. The moving auxiliary contact is a plain copper rod which can be set up many times before it needs replacing. Both the main and auxiliary contacts are located in a strong magnetic field provided by a powerful blow-out magnet, while the arc is broken in a large arc chute. This is hinged and can be thrown back and retained by a hooked catch to permit inspection of the contacts. On its outside surfaces the chute carries long iron pole pieces for the blow-magnet, and, internally, it has long arcing horns which engage with their respective contacts when the chute is in its working position. The magnetic field is so directed that the arc is immediately forced off the auxiliary contacts on to the arcing horns, and the poles of the arc then kept moving along the horns until the arc is sufficiently extended, and finally broken. In order to reduce the mechanical shock on the armature when the contacts close, an air dash pot is fitted. This allows the breaker to close and be held firmly on any load below that for which the overload release is set.

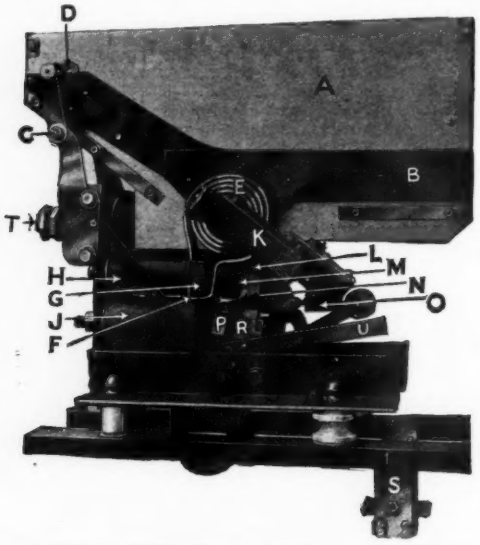


E, blow-magnet windings; K, blow-magnet; L, spring controlling auxiliary contact; M, hold-on armature; N, top of duralumin switch arm; 1, positive (fixed) contact (has ball and socket-fixing arrangement for quick adjustment); 2, negative (moving) contact; 3, positive (fixed) auxiliary contact; 4, positive (moving) auxiliary contact. (Note good condition after a series of short-circuit tests on 2,000-kW rotary convertor, 1,500 volts, through external resistance of only .0025 ohm); 5, frame carrying auxiliary contact 4; 6, engaging surface for negative arcing horn; 7, engaging surface for positive arcing horn, also clamp for adjusting 3.

Fig. 2.—Circuit Breaker Contacts.

The overload release consists of windings carrying the load current, so arranged that they strengthen the field in the cores of the hold-on magnet, but not in its armature. When the load has grown to a pre-determined amount it sufficiently saturates the magnet cores, lowering their effective permeability until the magnet hold-on windings are no longer able to maintain sufficient flux in the armature which is thus released.

If the load current rises suddenly in the releasing windings, the flux which they generate cannot immediately be forced through the hold-on magnet, because of the reaction of its hold-on winding, and also because of eddy-current effects in the solid cores of the magnet. Consequently, the armature is immediately robbed of its magnetism, in order to feed that part of the magnetic circuit controlled by the releasing coils. This gives quick action, and discriminates between a slowly-increasing overload and the sharp rise that is experienced under short-circuit conditions. As the quick magnetic changes



A, arc chute; B, blow-magnet pole extensions; C, pivot for arc chute; D, catch for arc chute; E, blow-magnet winding; F, releasing-winding (one turn looped from blow-magnet winding); G, pole pieces (for field created by releasing winding); H, hold-on windings; J, closing coil; K, blow-magnet; L, spring controlling auxiliary contact; M, hold-on armature; N, duralumin switch arm (open position); O, opening springs; P, closing armature; R, pivoted frame carrying P, and also pivot for N; S, frame carrying electrical interlocks; T, positive terminals; U, bar for hand closing-handle removed.

Fig. 3.—Construction of Circuit Breaker.

are restricted to the iron of the armature and the pole pieces, all of which are laminated, and as there is a large air gap in the magnetic circuit controlled by the releasing windings, the armature is released at the moment when the current reaches the critical value for which the release has been adjusted. Adjustment of the release is obtained by varying the current in the hold-on windings by means of an adjustable resistance connected in series. No mechanical alterations are necessary, and a change can be effected by remote control, or automatically, if desired.

Legal.

Carew & Keeble v. Palmer.

IN the Chancery Division, on June 21st, Mr. Justice Maugham granted an injunction to Messrs. Carew & Keeble, 44 & 46, Kingsway, W.C., proprietors of an electrical device called the "Gacor flasher," restraining Leonard Palmer, trading as the Eagle Electric Co., 1 & 3, Regent Street, W., the owner of a device known as the "Eagle blinker," from issuing threats of legal proceedings for infringement to purchasers of the plaintiffs' patented article.

Mr. SHELLEY, for the plaintiffs, explained that the "flasher" was a sort of adaptor which, when attached to an electric lamp, caused it to flash on and off. In consequence of the defendant's action the plaintiffs had suffered serious loss of business.

Mr. JACOB, for the defendant, said he had threatened nobody with any proceedings, and the plaintiffs' action was, according to Mr. Palmer's affidavit, due to a misunderstanding. The real defence to a motion of this kind was an action for infringement, but the defendant was unable to do that because, although he had paid for a licence under the patent for the "blinker," he could not get it.

His LORDSHIP said it was a clear case for an injunction to restrain threats, and the costs would be costs in the action.

Marconi Royalties Appeals Succeed.

IN our last issue we reported that Mr. Justice Luxmoore had allowed the appeals of Marconi's Wireless Telegraph Co., Ltd., from orders made by the Comptroller-General of Patents directing the company to grant manufacturing licences upon special terms to the Brownie Wireless Co. of Great Britain, Ltd., and the Loewe Radio Co., Ltd.

In the Brownie case, after reviewing the evidence, his Lordship said that he could not agree that the Brownie Co. had established three essential things: (1) That the patentees had refused to grant the applicants a licence on reasonable terms; (2) that the trade or industry of the country or persons was prejudiced by the refusal of the grant; and (3) that the grant of a licence was in the public interest. His Lordship held that the applicants merely wished to enter an existing industry; that the terms of the licences granted by the Marconi Co. were reasonable, and that the public was already well served.

As regarded the Loewe case there had been no definite refusal of a licence. He thought, however, that when a licence was granted to the applicants, the terms fixed by the Comptroller-General, *viz.*, 10s. for a triple valve and 7s. 6d. for a double one, were reasonable. He considered that it would not be reasonable to treat them as three or two separate valves with a 12s. 6d. royalty on each. In conclusion, his Lordship said that he hoped that the parties would be able to come to terms.

Alleged Long-Firm Fraud.

BEFORE Mr. Justice McCardie, at the Central Criminal Court on June 13th, the hearing was commenced of the case against C. M. Ellison, traveller, S. Coster, electrician, G. Sturley, engineer, and J. C. Sturley, job buyer, who were charged with obtaining wireless goods by false pretences with intent to defraud. The accused pleaded not guilty.

Mr. MCCLURE, who appeared for the prosecution, said that the defendants were charged with conspiring together and with other persons unknown to cheat and defraud persons who might be induced to supply goods on credit. The firm from whom a large quantity of valves had been obtained was Cleartron (1927), Ltd. The prosecution alleged that the fraud started when the defendant Ellison sent a letter to Cleartron, Ltd., suggesting that he should represent them and obtain orders for radio valves. As a result he was appointed as a traveller in the East and North of London, and immediately a number of bogus orders began to come in from the other defendants. Goods were delivered and never paid for. An order came to Messrs. Cleartron from a firm known as J. H. Denny. That was a firm which it was alleged never existed at all. Orders for cords amounting to £130 were given in the name of George Sturley. They were supplied, but not paid for. In August of last year an order for 24 dozen valves to the value of about £41 was received from J. C. Prill & Co., of Perth Road, East Ham, the registered address of J. C. Sturley. A sum of £10 was all that was received in payment for those goods. Another order for 12 dozen valves was given by Frederick Ashley & Sons. It was alleged that that firm was really Coster, who was also known as Coleman. Their place of business was a cellar under a garage.

On June 17th the defendants were found guilty, and Det.-Sergt. Clark said that Ellison had been previously convicted and bound over for conspiracy to defraud by a system of long-firm fraud with another man. The defendant, G. Sturley, was now serving a sentence of eight months' hard labour for larceny, and he had also previously been convicted. The other Sturley had also been sentenced on several occasions for burglary and forgery. Coster was an undischarged bankrupt and had also been convicted of carrying on long-firm frauds. Long-firm frauds were undoubtedly on the increase.

The Judge sentenced Ellison, Coster and G. Sturley to three years' penal servitude and J. C. Sturley to 15 months' hard labour.

Earlsdon Radio Supplies Co., Ltd.

A PETITION for the compulsory winding-up of this company, of 44, Albert Street, Newark, was granted by Judge Hildyard at the Nottingham County Court last week.

Mr. C. CURSHAM, representing the petitioning creditors, said that the nominal capital of the company was given at £500, and the issued capital at £205. There had been a judgment for £232 for goods sold and delivered, and as that judgment had not been satisfied, the petitioning creditors, Burgoyne Wireless, Ltd., London, applied for the Order.

One-piece E.H.P. Insulators.

The high voltages at which electric power is now being transmitted in Germany have created many problems for manufacturers of porcelain insulators. Hitherto, it has been necessary to use insulators built up in sections. For use in connection with one of the recently-completed 220,000-V lines, the Hermsdorf-Schomburg Isolatoren Gesellschaft has lately succeeded in producing porcelain insulators in one piece; they stand 8 ft. 2 in. in height and have an outside diameter of 39 in.; as they weigh nearly 20 cwt., it will be realised that the greatest care had to be taken and special plant installed to ensure even firing of the whole of the refractory material used in the manufacture of the insulators.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

The Price of Brains.

I usually read the REVIEW from cover to cover, and therefore cannot miss the "joke column" by the way. I note in the current issue that a certain town council invites applications for the post of burgh electrical engineer at a salary (?) of £150 per annum. Thank heaven I am not looking for a job, and I pity the poor down-and-out electrical engineer who is the successful applicant for such a post. This sort of thing is degrading to the whole electrical engineering profession, and if it continues we shall soon find our friends being offered a few iron washers in return for their highly efficient service.

Alex. Milne.

Glasgow, E.2, *June 22nd*, 1929.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specification will be printed and abridged, and all subsequent proceedings will be taken.

1928.

1,695. "Electric rotary convertors." Allmänna Svenska Elektriska Aktiebolaget. August 12th, 1927. (295,368.)

2,566. "Coupling of two alternating-current mains of different frequencies." Siemens-Schuckertwerke Akt. Ges. February 18th, 1927. (285,478.)

5,899. "Magnetic cores for electro-magnetic devices." J. H. Buchanan and Associated Electrical Industries, Ltd. February 24th, 1928. (312,658.)

5,963. "Electric lamps for the prduction of ultra-violet rays." W. D. Verschoyle. February 25th, 1928. (312,591.)

6,060. "Excitation of dynamo-electric machines." English Electric Co., Ltd., and J. C. Wilson. February 27th, 1928. (312,616.)

6,061. "Electric couplings for galvanic batteries." Oldham & Son, Ltd., and W. D. Wilde. February 27th, 1928. (312,617.)

6,067. "Methods of manufacturing electric lamps, discharge tubes, and the like." A. Lierenfeld. February 27th, 1928. (312,659.)

6,345. "Protective devices for electric generating and transmitting systems." English Electric Co., Ltd., and F. A. Harper. February 29th, 1928. (312,622.)

6,936. "Electric couplings." A. Reyrolle & Co., Ltd., and F. Coates. March 6th, 1928. (312,701.)

7,033. "Electric signalling." Siemens Bros. & Co., Ltd., and D. A. Christian. March 6th, 1928. (312,706.)

7,389. "Diaphragms and the like for electrolytic cells." Dr. A. Wacker Ges. für Elektrochemische Industrie Ges. and Dr. H. Muller. March 9th, 1928. (312,713.)

7,427. "Electric motors." G. H. Fletcher, R. Brooks, and Associated Electrical Industries, Ltd. March 9th, 1928. (312,715.)

7,729. "Electrically-propelled locomotives and trains." G. R. Higgs and Associated Electrical Industries, Ltd. March 13th, 1928. (312,730.)

7,942. "Voltmeter." W. M. Thornton. March 15th, 1928. (312,724.)

8,241. "Protective arrangements for electric power lines or the like." J. Whitcher, R. O. Kapp, and C. G. Carrothers. March 19th, 1928. (312,725.)

8,338. "Systems of electric motor control." British Thomson-Houston Co., Ltd., F. H. Harris, L. R. Nixon, and J. V. Peacock. March 19th, 1928. (312,730.)

8,647. "Devices employing electromagnets." G. Wall and Associated Electrical Industries, Ltd. March 21st, 1928. (312,734.)

8,682. "Automatically-operated electric switches." J. Alexander. March 22nd, 1928. (Cognate application, 15,867/28.) (312,735.)

9,060. "Tanks, more particularly for oil-immersed electrical apparatus." E. J. Jenkins. March 24th, 1928. (312,740.)

10,020. "Electric relays." International General Electric Co., Inc. April 4th, 1927. (288,210.)

10,986. "Electrical phase convertors." M. Moneyron. April 21st, 1927. (289,054.)

10,993. "Electrically-operated loud-speakers." C. J. Nesbitt-Dufort and O. & S. Oilless Bearing Co., Ltd. April 13th, 1928. (312,756.)

11,815. "Arrangement for the testing of electric resistances by means of a cross-coil instrument." Siemens & Halske Akt. Ges. June 24th, 1927. (Addition to 288,288.) (292,579.)

12,182. "Arrangement to protect capacitive loud-speakers against breakdown." M. Von Ardenne. April 26th, 1927. (289,472.)

12,252. "Process and apparatus for timing the ignition of electric projectile fuses." Rheinische Metallwaaren-und Maschinenfabrik. April 28th, 1927. (Addition to 273,338.) (289,473.)

13,101. "Circuit breakers affording overload protection for two electric motors of different powers." A. Reyrolle & Co., Ltd., and H. Bickerton. May 4th, 1928. (312,779.)

13,554. "Sparking plugs." B. Hopps and A. M. Lodge. May 8th, 1928. (312,782.)

15,694. "Telephone apparatus for self-connecting telephone-exchange offices." C. Hill. May 29th, 1928. (312,807.)

15,910. "Electric cells or batteries." W. Peto, H. M. Genese, and Pritchett and Gold & E.P.S. Co., Ltd. May 31st, 1928. (312,810.)

16,315. "Method of treating substances used for the impregnation of cables." Felten & Guilleaume Carlswerk Akt. Ges. March 30th, 1928. (306,748).

16,733. "Filter for preventing distortion of telephone currents." Soc. des Téléphones Grammont. June 15th, 1927. (Addition to 287,847. (292,144.)

17,226. "Printing telegraph receiver." F. W. Cook. June 14th, 1928. (312,821.)

17,285. "Variable-capacity electrical condensers." A. Preen. June 14th, 1928. (312,822.)

17,289. "Insulating compound for electrical conductors." Cablon, Ltd., and Dussek Bros. & Co., Ltd. January 11th, 1928. (303,852.)

17,297. "Thermally-operated electrical switches." N. Dennes and Associated Electrical Industries, Ltd. June 14th, 1928. (312,823.)

17,706. "Electric dry cell." H. Shimidzu. June 19th, 1928. (312,828.)

19,967. "Means for effecting the accurate or relative synchronism of working motors, for instance, for driving paper-making machines." Akt. Ges. Brown, Boveri et Cie. July 8th, 1927. (293,708.)

20,755. "Electric accumulators." H. Dean and Chloride Electrical Storage Co., Ltd. July 17th, 1928. (312,848.)

20,989. "Apparatus for electric farming which may serve for hail protection." P. Lepine. July 19th, 1927. (294,183.)

21,713. "Electric accumulators." B. Heap and Chloride Electrical Storage Co., Ltd. July 26th, 1928. (312,851.)

21,749. "Electric switches." G. H. Ide and H. L. Bentley. July 27th, 1928. (312,853.)

21,750. "Electric tumbler switches." G. H. Ide and H. L. Bentley. July 27th, 1928. (312,854.)

22,210. "Control system for rectifiers and other high-vacuum apparatus." Associated Electrical Industries, Ltd. August 6th, 1927. (295,031.)

22,318. "Electric transformers." International General Electric Co., Inc. August 2nd, 1927. (294,962.)

23,842. "Electrical apparatus for measuring the acuteness of hearing." Siemens & Halske Akt. Ges. September 1st, 1927. (296,433.)

24,770. "Loud-speakers." Ideal Werke Akt. Ges. für Drahtlose Telephonie. April 5th, 1928. (309,115.)

25,705. "Ventilation of dynamo-electric machines." General Electric Co., Ltd., and F. M. Jackson. September 7th, 1928. (312,879.)

26,987. "Electric motors." E. D. Feldman. September 20th, 1928. (312,885.)

26,997. "Electromagnetic compasses of the earth inductor type." British Thomson-Houston Co., Ltd. September 22nd, 1927. (297,465.)

27,920. "Battery hand lamp." Burgess Battery Co. October 10th, 1927. (298,531.)

31,338. "Electric conductors for high voltages." International General Electric Co., Inc. October 29th, 1927. (299,717.)

33,388. "Ignition systems of internal-combustion engines." Alvis Car and Engineering Co., Ltd., and G. T. Smith-Clarke. November 14th, 1928. (312,894.)

1929.

11,967. "Electro-deposition of metals." Electro Bleach and By-products, Ltd., J. Hollins, and D. Jepson. February 25th, 1928. (Divided application on 312,395.) (312,598.)

12,030. "Electro-deposition of metals." Electro Bleach and By-Products, Ltd., and J. Hollins. February 25th, 1928 (Divided application on 5,977/28.) (312,599.)

12,031. "Electro-deposition of metals." Electro Bleach and By-products, Ltd., J. Hollins, and D. Jepson. February 25th, 1928. (Divided application on 312,305.) (312,600.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from June 19th:—

Si-men-seh (Chinese lettering and design). Nos 498,932 to 498,402 inclusive. All goods in Classes 7, 8, 9, 10, 11, 13, 18, 21 and 22. No. 436,402. Class 50. Electrical insulating substances and materials, &c.—Siemens and Halske, Berlin. (British representatives: Haseltine, Lake & Co., 28, Southampton Buildings, W.C.2.)

Mic. No. 479,196. Class 8. Components of telegraphic, telephonic and radio apparatus.—Micanite and Insulators Co., Ltd., Blackhorse Lane, Walthamstow, E.17.

Teletone. No. 502,394. Class 8. Instruments and apparatus for radio signalling, thermionic amplifiers and parts thereof, &c.—Lichtenberg & Jones, Ltd., 12, Emerald Street, W.C.1.

Electric Light's Jubilee.

The proposed world-wide celebration of "Light's Golden Jubilee" has aroused interest, and we are pleased to learn that the Council of the (British) Institution of Electrical Engineers has addressed a letter to the National Illuminating Committee of the United States, which is organising the celebrations, and also to similar committees in other countries, requesting the recognition of the pioneer work of Sir Joseph Swan by associating his name in some way with the proposed celebrations. The I.E.E. draws attention to the fact that on December 20th, 1928, it celebrated the jubilee of the making and public exhibition of the first carbon incandescent lamp by the late Sir Joseph Swan, whose name was subsequently associated with that of Mr. T. A. Edison in the Edison and Swan Electric Light Co., of Ponders End, near London. Actually the production of that lamp slightly ante-dated the independent invention of the incandescent carbon lamp by Mr. Edison, and the fact that Swan's was the first practical incandescent lamp is one of which we in England have always been rather proud.

The International Illumination Commission will hold its triennial session in England in 1931, and it will be coupled with an important illumination congress. All the illumination interests in this country are so much occupied with preparations for the congress that the I.E.E., which is strongly supporting the congress, feels that it would prejudice the success of those preparations if any extensive part were taken in further celebrations before that date. So far as this country is concerned, it is felt that the cause of good lighting can best be served by concentrating attention upon the forthcoming congress. The Institution of Electrical Engineers has, however, every sympathy with the efforts that will be made this year to attract widespread public attention to the subject.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ARBROATH.—Cinema; Clark & Blyth, architects.

BARNET.—Houses (153), Wood Street, for Auburn & Sons, builders.

BATH.—Additional 100 houses, Twerton, for the T.C.; city engineer.

BECKENHAM.—School (400 places), for the E.C.; Harris and Porter, architects, 16a, John Street, Adelphi, W.C. (returnable deposit of £5 5s.).

BEDFORD.—Premises for Marks & Spencer, Midland Road; Usher & Anthony.

BENFIELDSIDE.—School extensions (£8,580); Durham County Education Committee.

BILSTON.—Houses (154), for the U.D.C.; Eadie Towers and Co., builders, Wolverhampton.

BIRMINGHAM.—Cinema, High Street, Aston, for Cinema Proprietors, Ltd.; Satchwell & Roberts, architects, 7, Waterloo Street.

BLANDFORD.—Pumping station and sewage disposal works, for the T.C.; W. H. Radford & Son, engineers, Albion Chambers, King Street, Nottingham (returnable deposit of £3 3s.).

BOURNEMOUTH.—Bakery and flour store, Charminster Road; P. Parsons & Sons. Church, Charminster Road; Rev. O. H. Shiner. 'Bus station, The Square, for Hants & Dorset Motor Services, Ltd.; Jackson & Greenen, architects.

BRIDGWATER.—Additional 98 houses for the T.C.; borough surveyor.

BRIGHTON.—Cinema, East Street and Grand Junction Parade; Associated British Cinemas, Ltd. Alterations and additions, Palladium, King's Road; Blue Halls, Ltd.

BURNHAM (BUCKS).—Four-bay factory, Slough Estates, Ltd.; Canteen and restaurant, Buckingham Avenue; Taylor, Walker & Co.

BURY ST. EDMUNDS.—Housing scheme (40), for the T.C.; R. H. Beaumont, borough surveyor (returnable deposit of £2 2s.).

CATTERICK CAMP (YORKS).—R.C. Church; Leonard Stokes and Drysdale, architects, London; William Ainley, Ltd., builders, York.

CHESTERFIELD.—Church; Rev. C. Mudford, St. Augustine's Vicarage.

CHINGFORD.—Telephone exchange for H.M. Office of Works, King Charles Street, London, S.W.

DARTFORD.—52 houses, Dartford Road and Stanham Road; W. J. Brise.

DONCASTER.—Technical and mining college; Director of Education. R.C. schools (£9,000); T. Jenkinson, Ltd., builders.

FARNHAM.—Cinema; A. L. Mackie.

FARNHAM ROYAL.—Housing scheme (800), for Slough Estates, Ltd. Business stores, Slough & District Co-operative Society, Ltd.; secretary.

FIFESHIRE.—School at Sinclairtown, Kirkcaldy. New Kirkcaldy High Primary School and reconstruction of Kirkcaldy West School; clerk, Education Authority, Kirkcaldy.

GOLDTHORPE.—Senior school (900 places), for West Riding E.C.; director of education, Wakefield.

HEYWOOD.—Paper mill extensions (£50,000 to £100,000), for Yates, Duxbury & Co., Heap Bridge.

HORNCHURCH.—Houses, Hillcrest Road; H. Saulsby (36), G. Crabb (22), Martin & Pearce (48); Cherry Tree Lane, C. G. Brooker (31).

HYTHE.—Houses, with electrical work, for the T.C.; F. S. Longley & Sons, builders.

ILFRACOMBE.—Pavilion extensions (£16,000), for the U.D.C.; surveyor.

KNOTTINGLEY.—Re-erection of portion of glassworks, for Bagley & Co. (£20,000).

LAURENCEKIRK.—School (£17,750); J. Miller, executive officer, Kincardineshire Education Authority.

LEIGHTON BUZZARD.—Development of Ivinghoe estate, Edlesborough (600 houses), for Farmborough Bros.; R. Humphreys, surveyor, East Twickenham.

LICHFIELD.—Sewage disposal works, Burntwood and Chasetown (deposit £2 2s.); C. E. Mays, engineer to R.D.C.

LINCOLN.—Extensions, technical college, with electrical engineering section, for the Governors; clerk.

LIVERPOOL.—Promenade extension scheme, Otterspool; land steward and surveyor, Municipal Buildings, Dale Street.

LONDON (WHITECHAPEL, E.).—Laboratory, East London College; L.C.C. & London University.

(STAMFORD HILL, N.).—Extensions, stores depôt (£15,500); L.C.C. architect.

(PECKHAM, S.E.).—Secondary school, Homestall Road (£35,500); C. P. Roberts & Co., Ltd., Holborn.

(SOUTHWARK, S.E.).—Reconstruction, John Ruskin school, Avenue Road (£32,500); L.C.C. Education Committee.

(CLAPHAM, S.W.).—Alterations, 68 to 86, Clapham Road; E. W. Wallis.

(BRIXTON, S.W.).—Enlargement, School of Building, Ferndale Road (£33,400); L.C.C. Education Committee.

(WESTMINSTER, S.W.).—Buildings, Approach Road, Milford Lane and Water Street, for Victoria Embankment Properties, Ltd.; Grace & Farmer. Rebuilding, 10, 11 and 12, Smith Square, for incorporation with Westminster House, Millbank; British American Tobacco Co., Ltd. Buildings, Vincent Street; Sir Edwin Lutyens. Buildings, for Imperial College of Science and Technology, Prince Consort Road; Sir Aston Webb & Son.

LOWESTOFT.—Factory extension, St. Peter's Street; P. W. Watson & Sons, Ltd.

MANCHESTER.—Public washhouse, Moss Side; city architect, Town Hall.

MERTHYR TYDFIL.—Mineral water factory, for Mr. Horrocks; Rees S. Harper, architect, Cefn.

MITCHAM.—Central school, Rowan Road (£34,940); G. H. Denne & Son, Ltd.

NEWCASTLE-UNDER-LYME.—New wing, High School (deposit £10 10s.); H. Poole, clerk to the governors.

PONTEFRACT.—Extensions, Tower Works, for Dunhills, Ltd.

RADLETT (HERTS.).—Church (£6,500), for the Congregational trustees; Smee & Houchin, architects, Fleet Street, London; Willmott & Sons, builders, Hitchin.

RAMSGATE.—Electric light plant installation, Haine hospital (£3,200), for Isle of Thanet Joint Hospital Board; Mr. Monkhouse, engineer.

RAVENSTHORPE.—Business stores for Long Buckby Self Assistance Industrial Society, Ltd.; Lawson Carter and Coles, architects, 31, Market Square, Northampton (returnable deposit of £1 1s.).

RICKMANSWORTH.—Two schools, for Herts. E.C.; director of education, Hertford.

ROXBURGHSHIRE.—Conversion of mansion at Hawick into hostel; clerk, Education Authority.

ST. ALBANS.—Housing scheme (46), for the R.D.C.; H. F. Mence, architect, 43, Upper Lattimore Road (returnable deposit of £2 2s.). Rebuilding, Chequers cinema and theatre (£6,000), for Herts. Cine-Theatre Corporation, Ltd.; H. F. Mence and H. R. Finn, architects.

SALFORD.—Additions to Union Infirmary, Stott Lane, Hope (deposit £2 2s.); W. T. Gunton & Son, architects, 10, Marsden Street, Manchester.

SCARBOROUGH.—Hospital (£120,000), for the committee; secretary.

SELSDON.—School (624 places), for Surrey E.C.; W. W. Finny, secretary, Kingston-on-Thames.

SOUTH BENFLEET.—School extensions (200 places), for Essex E.C.; W. O. Lester Smith, director of education, Chelmsford.

SOUTHPORT.—Adaptation of Palais de Danse as a cinema; manager.

STALYBRIDGE.—Domestic science centre at Girls' Central school (deposit £2 2s.); P. Howard, architect, 88, Mosley Street, Manchester.

STOCKPORT.—Re-erection of bleachworks and warehouse, for Robert Bailey & Son, surgical dressing manufacturers, Marriott Street Mills.

STRETFORD.—Domestic science centre, at Seymour Park Council School, Old Trafford; Percy Howard, architect, 88, Mosley Street, Manchester.

SWANSEA.—Low level drainage scheme (£108,000); borough engineer. Extensions, Technical College (£26,442); Griffith Davies & Co.

TORQUAY.—Cinema, Castle Circus, with electrical work, for the Burlington Picture House (Torquay), Ltd.; architects, Bridgman & Bridgman, Torquay, and Robert Atkinson, 36, Bedford Square, London, W.C.

TYNEMOUTH.—Theatre, Russell Street, North Shields; Dixon & Bell.

UTTOXETER.—Housing scheme (70), for the U.D.C.; surveyor.

WELLINGBOROUGH.—Additional 124 houses, for the U.D.C.; surveyor.

JUL 8 1929

The ELECTRICAL REVIEW

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Advertisement Index, see page xliv. *Official Notices, see Sup. 32.*

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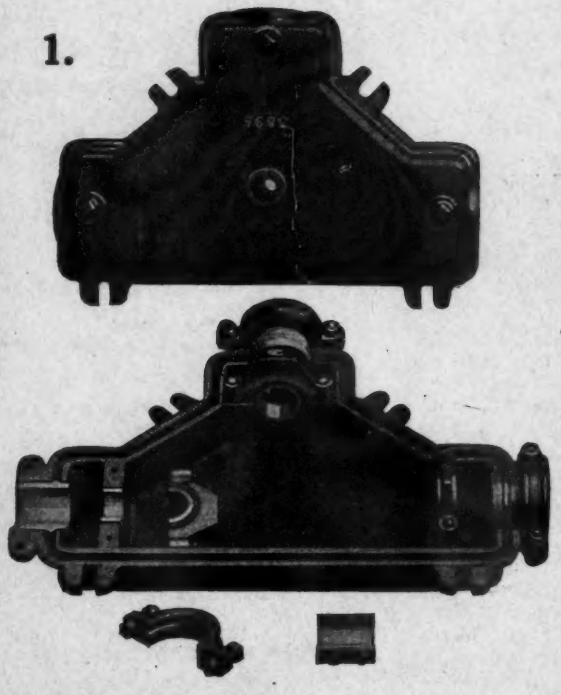

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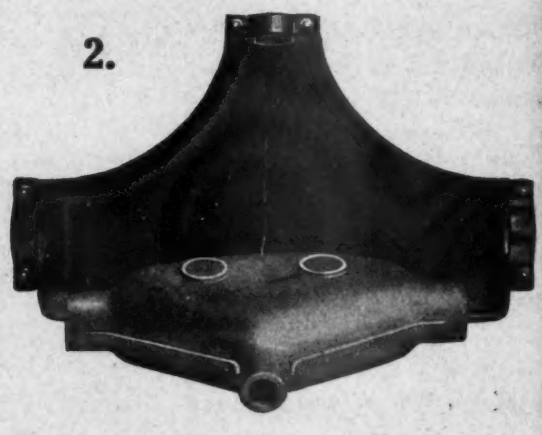

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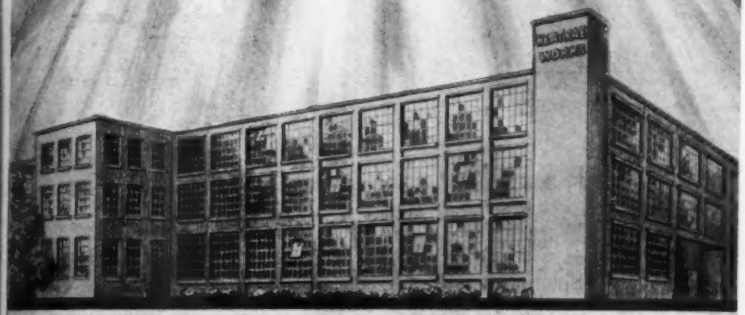

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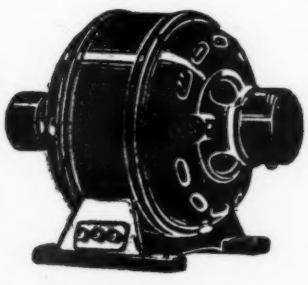

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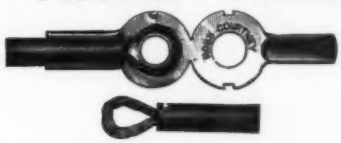

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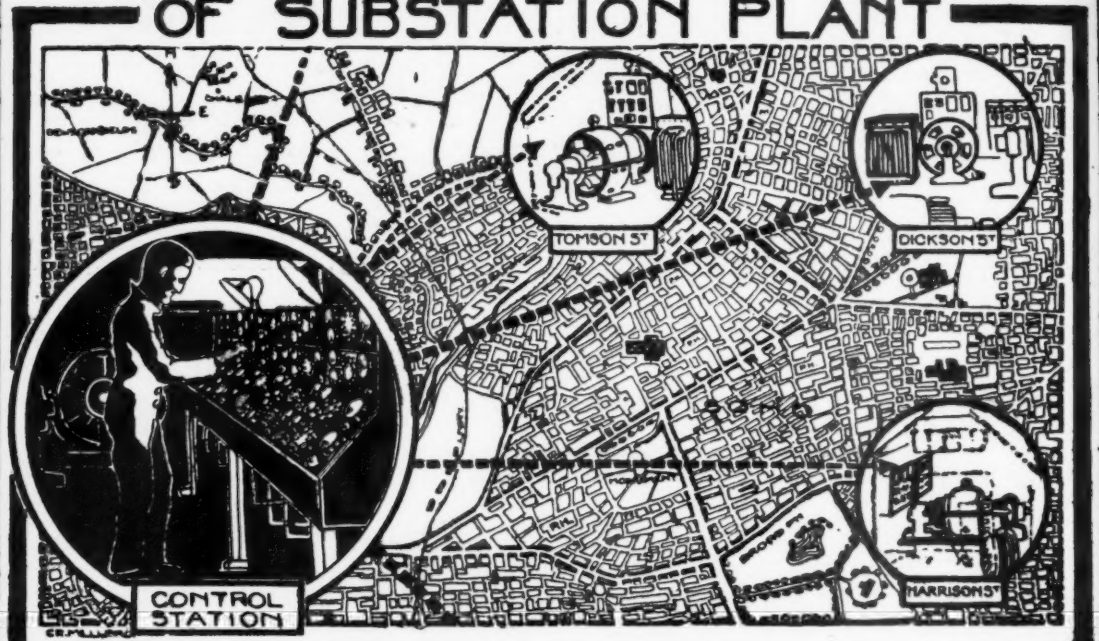

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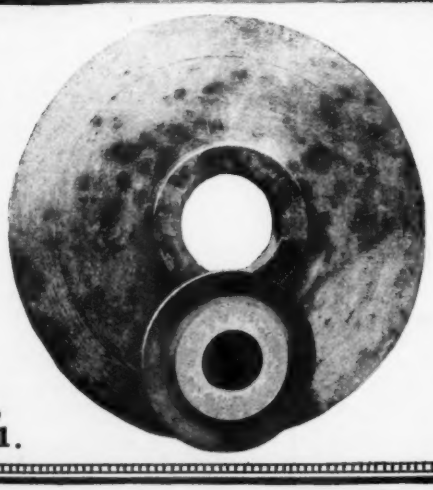
ROTOR DISCS & FORGINGS.

ABOVE is illustrated a forging for a rotor, weighing 43 tons before being machined. Two turbine discs are also shown, the larger of which weighs 30 cwts. and is 70' in diameter.



NORTH-EAST COAST EXHIBITION, STAND No. 582/5, AVENUE G, Palace of Engineering, NEWCASTLE-ON-TYNE.

INTERNATION AERO EXHIBITION, OLYMPIA—STAND No 85, July 16th—27th.

REGISTERED TRADE MARK

London Office :
VICKERS HOUSE, BROADWAY, S.W.1.

RIVER DON WORKS, SHEFFIELD ENGLAND.

REDUCED PRICES.

BOTRADE AGAIN SHOWS THE WAY—THIS TIME TO SUBSTANTIAL PRICE REDUCTIONS; THE RESULT OF AN ENORMOUSLY INCREASED OUTPUT, COMBINED WITH MODERN PRODUCTION METHODS.

WE HAVE PLEASURE IN ANNOUNCING PRICE REDUCTIONS ON THE FOLLOWING APPARATUS:

BOTRADE Q TYPE SWITCHES AND COMBINED SWITCHES AND FUSES; 10, 15, 30, 40, 60 & 100 AMPS.
" KNIFE TYPE SWITCHES AND COMBINED SWITCHES AND FUSES; 40, 60, 100 & 200 AMPS.
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" PATENT IRONCLAD DISTRIBUTION BOARDS; 5/10, 15 (SHORT), 15 (LONG), 30, 40, 60 & 100 AMPS.
" PATENT HINGELESS (NON-CORRODIBLE) TEAK FUSE BOARDS; 15 AMP. SHORT BREAK, ALSO MADE FOR 5 & 25 AMPS.

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PHONE: EAST 671/2 THE DISTINCTIVE REGD. TRADE BOTRADE MARK ELECTRICAL GEAR GRAMS: AUCHOBHAM

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WE MAKE LARGE
COMMUTATORS.

2-ton Commutator ready for Turning.

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HIGH FREQUENCY ALTERNATORS. ELECTRIC WELDERS.
BRUSH HOLDERS. PHOTOGRAPHIC ARC LAMPS.

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Have you had full value for all the wear they show? Has the acid been treating them fairly? Users of Oasis acid answer yes, because they know that the purity of this acid ensures the long and efficient life of the accumulator.

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Cressall Regulators are made in a wide range of models suitable for every purpose and embody the soundest design and the highest quality in materials and workmanship. Our illustration shows a Front-of-Board Open Type Regulator and we invite YOUR inquiries knowing we have just the regulator you are needing and . . . at the right price too !

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Tel.: Central 3463. 'Grams: Ohmic, Birmingham.

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The satisfactory illumination of switch cubicles, &c., may be accomplished by the use of the above units. These fittings have been installed in the BARKING POWER STATION of the COUNTY OF LONDON ELECTRIC SUPPLY CO.

Light at the "Right" Angle.

HEYES & Co. LTD.
WIGAN.

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A NUMBER OF BATTERY MAKERS WHO STYLE THEMSELVES THE ACCUMULATOR MAKERS ASSOCIATION, for many years have had a Sales Agreement with the two Electrical Contractors Associations for England and Scotland, whose Members have Retail organisations in all parts of the United Kingdom and Ireland.

The Accumulator Makers' Association Sales Agreement does not permit any Member of these two Selling Organisations to recommend on his own initiative or voluntarily submit a quotation for the supply of an Improved Tungstone Battery

IF A PROSPECTIVE TUNGSTONE BUYER PERSISTS in having an improved Tungstone Battery, the Accumulator Makers' Association Sales Agreement, permits any Member of these two selling Organisations to supply a Tungstone High-Pressure Machine Die-Cast Battery, but ONLY under these conditions can a Member of these Associations accept an order for Tungstone.

If prospective Tungstone purchaser experiences any difficulty please communicate with Tungstone who provides a reliable local contractor; or Tungstone will through its own organisation erect and afterwards make periodical Inspections of the Battery, also give reliable, secured Guarantees, equal to the Accumulator Makers' Association.

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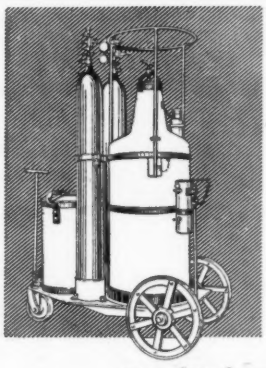

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ONLY from the carbide to water system, as adapted to the "Cyclone" Generator, can you obtain *cool, clean and pure* acetylene gas—free from lime dust and other impurity. By carbide to water, the agitation of the water itself removes the slaked lime; *all* the gas is released, and cools as it rises through the water.

Cyclone Generators are safe. Automatically a small quantity of carbide is fed to the water, and this operation is repeated so long as the gas is being used. Fool-proof and economical!

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The greatest flexibility of gas generation to suit the smallest and greatest demand. No over-generation or stand-by losses.

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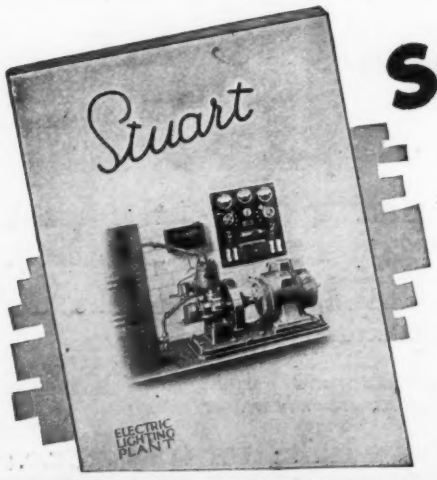

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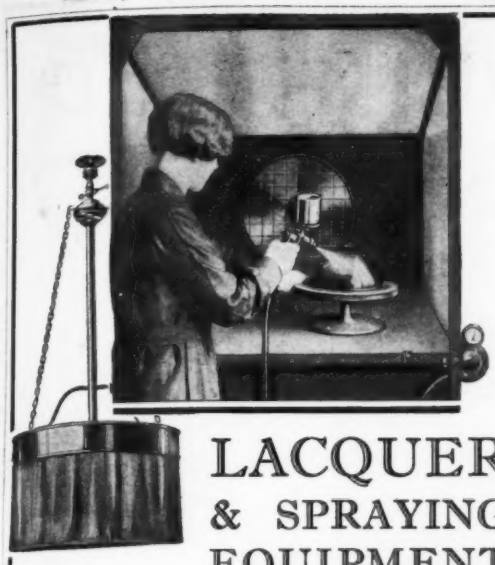

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Portable Electric Drills.

DRILLING metal or wood with Little Giant Portable Electric Drills is easy labour and increased production results from their use because they are fast, always fit, and have the all-essential staying power.

OUTSTANDING FEATURES

Ease of Manipulation.
Conveniently placed Trigger Switch.
Light Weight.
High Drilling Speed.
Ball Bearings throughout.
Air-Cooled Motor.

Write for Catalogue No. 15, giving full particulars of our "Little Giant" Machines.

Drill fitted to Cable Reel, which automatically takes up the slack of the cable.

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Main Works: Fraserburgh, Scotland.
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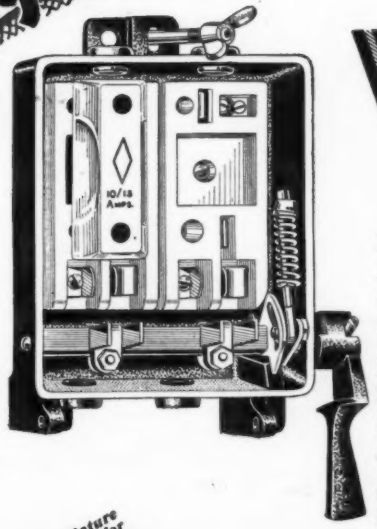

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IT *MUST* BE

Birmingham and other Electric Supply Authorities have standardised it for housing scheme installations while hundreds of contractors also specify it as a matter of course.

Ever since its introduction the Vinette Switch Fuse has been a favourite among miniatures. What is the reason?

The advanced design of the Vinette created a new standard of reliability. Organised large-scale production followed and consequent bed-rock prices.

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SAMPSON ROAD NORTH • BIRMINGHAM

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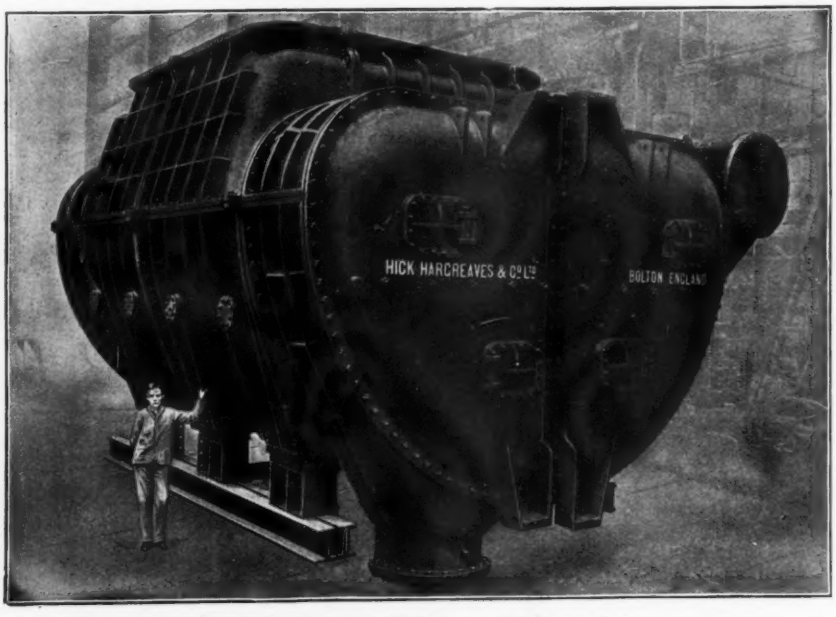
HICK, HARGREAVES & CO., LTD.

— BOLTON. —

HAMS HALL SUPER POWER STATION,

CITY OF BIRMINGHAM.



One of the main Condensers—45,000 sq. ft.—erected in our shops.

WE have supplied the whole of the condensing plant and feed water system for this station, from the Turbine Exhausts to Boiler Feed Checks, including—Air, Extraction, and Circulating Pumps, High and Low pressure Feed Water Heaters, De-Aerators, Boiler Feed Pumps, Feed Tanks, Valves, Piping, etc.

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ANTARCTIC Electric Fans have well established themselves in past seasons, and we continue to offer them confident that they will each in their respective classes give the best of service. All types are represented in the range:—Swivel and Trunnion and Fixed Body Desk Fans, Oscillating Fans, Ceiling Fans, and Exhaust Fans. We carry large stocks, and prompt delivery can be made.

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THE "IDEAL" FAN.

A 9-inch Fan with Enamelled Black Iron Body, polished brass guard, fitted with Universal type motor for A.C. and D.C. The Fan is fitted with a Starting Switch and two-speed Regulator and Base, and is complete with Flex and Adapter.

37/6 EACH.

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Falk, Stadelmann, & Co. Ltd.

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WE CARRY EXTENSIVE STOCKS OF ASSOCIATION LAMPS.

Also all makes of Radio Valves

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MANY "HART" BATTERIES are installed in a land whose history and achievements will live through the ages.

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THE BATTERY OF QUALITY

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Goodall Ad.

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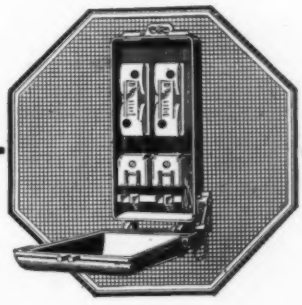

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The "Memrex" series of switches was designed to eliminate trouble for the installation engineer and the user, and at the same time to reduce installation costs.

There is no better switch at the price.

There is no cheaper switch of the quality.

"Memrex" is made for 500 volt pressure in 15-30-60-ampere capacity. D.P. and T.P. with and without fuses.

See that "Memrex" is used on your jobs. It will reduce your costs and ensure your reputation.

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ALWAYS LEADING

MIDLAND ELECTRIC Manufacturing Co, Limited.
BARFORD ST. M·E·M BIRMINGHAM
SPECIALISTS IN IRONCLAD SWITCH & FUSE GEAR

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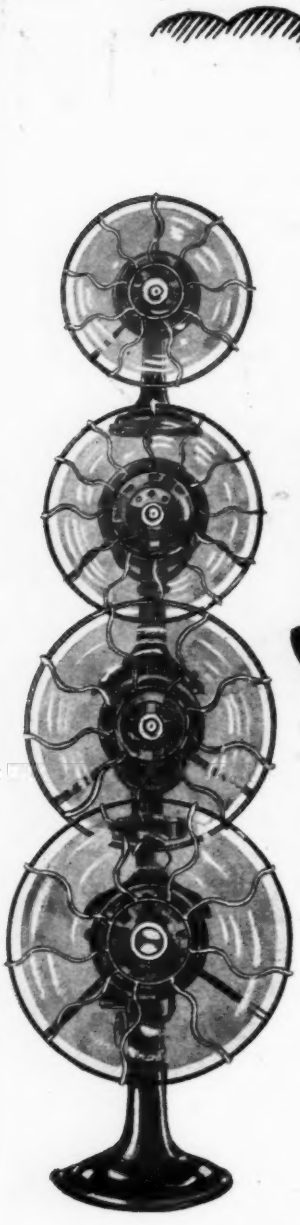

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Blow the Clouds of slack trade away—

There's never a dull season for the dealer who concentrates on Sunco Fans. Their steady, reliable efficiency, silent running and "foolproof" construction are cardinal sales features which engender confidence in the dealer and satisfaction in his client.

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Ask for our Fan Catalogue.

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Telegrams:—
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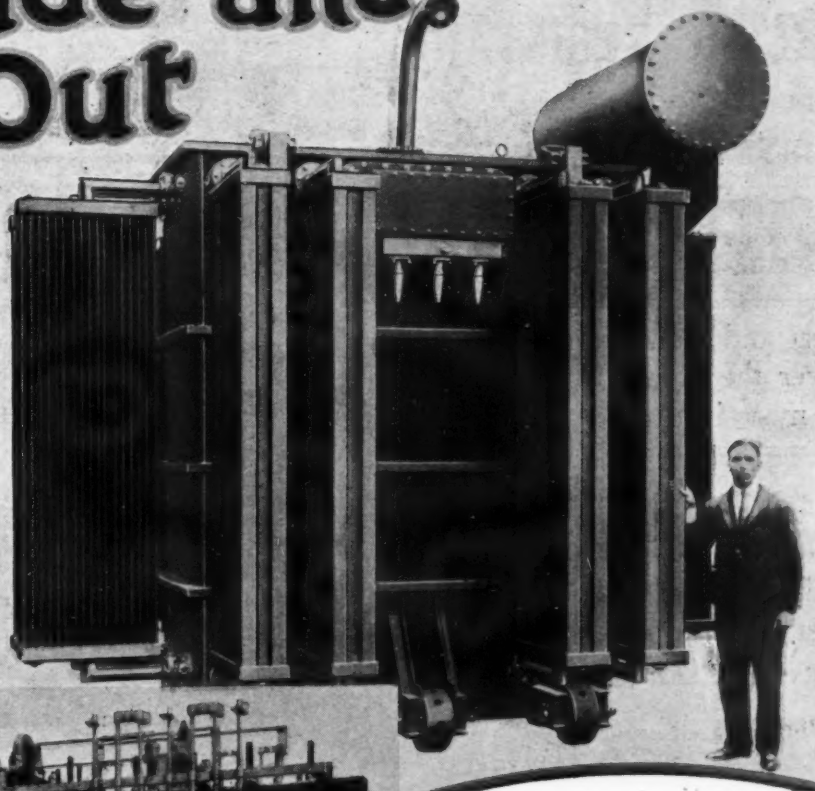
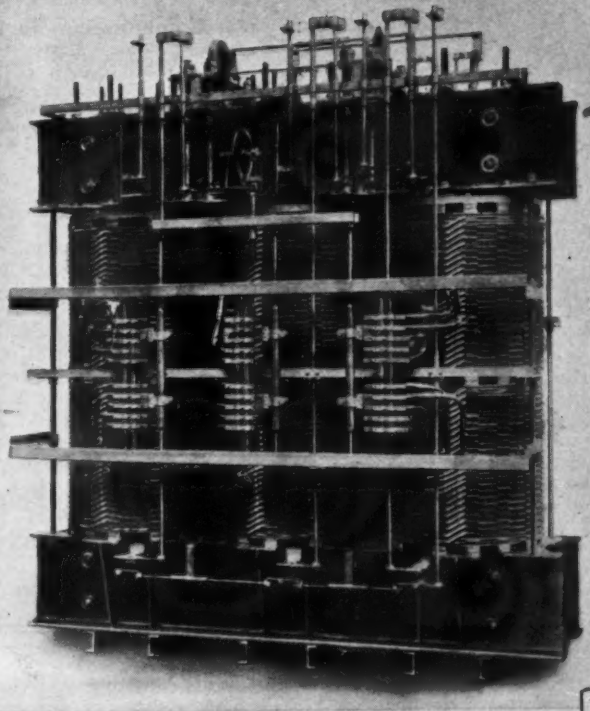
NEWCASTLE-ON-TYNE:
112, Pilgrim Street.

Inside and Out





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The Transformer illustrated is a 4,000 kVA 11,000/5,500 volts, 25 cycles. It is arranged for series parallel connection so that at 50 cycles its output is 8,000 kVA 11,000/5,500 volts. The oil tank is arranged with cooling radiators.

FALCON WORKS
LOUGHBOROUGH
Leicestershire.

THE BRUSH ELECTRICAL Co. Ltd. ENGINEERING

DI-ELECTRIC STRENGTH

3352 VOLTS PER MIL

and after 48 hours' immersion in water

2784 VOLTS PER MIL

SPECIFIC RESISTANCE

$5{\cdot}9 \times 10^{14}$ w/cm³

ARE OFFICIAL TEST READINGS OF

213 "ARMACELL"

Heat and Humidity dangerously lower the di-electric strength of most insulating varnishes

213 "ARMACELL"

ENSURES SAFETY

AT ALL WORKING TEMPERATURES AND UNDER VERY EXACTING CONDITIONS.

When heated from 15° to 90° C. its di-electric strength **falls only 18·5%**

When immersed 48 hours in water its di-electric strength **falls only 17%**

The Insulation Resistance of

213 "ARMACELL"

EQUALS THAT OF GOOD RUBY MICA.

HIGH TENSION OIL WATER

No. 1255B "Ohmaline"

(BLACK INSULATING VARNISH)

MEETS EVERY NEED.

Di-electric Strength **1500 Volts per mil.**

Falls after 48 hours in water **only 3·3 per cent.**

HOT-OIL PROOF.

"SHAYDOLITE"

LAMP LACQUERS SURPASS

ALL SPRAYED LAMPS FOR RICHNESS OF COLOUR.

A wide range of Colours in Clear, Opal & Frosting Finish

APPLIED IN A MINUTE.

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HEAT-RADIATING

OIL-PROOF. **FLEXIBLE.**

Prevents Sparking at Commutator Ends

Breakdown Voltage 3600 Volts p·0·1 mm.

Suitable for HARD-WORKED TRACTION MOTORS.

"We never had a breakdown with 'INSULDERM'"

said a New Zealand Tramway Co. after 'Insulderm' had overcome constant trouble.

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"ANTI-SULPHURIC" ENAMEL

IS STILL THE FINEST PROTECTOR

from Acid Fumes and Spray in Battery Rooms, Chemical Works, Mines, &c., &c.

QUICK-DRYING. **GLOSSY.**

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POWER TRANSMISSION DEPT.

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Pure Rubber Tapes—Mica.
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Paper Sheets, Rods, Tubes, Cylinders, Panels.
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Telephone: City 6251 (Ex. 49.) **SPICERS LTD.** *Telegrams* Nykoping, Lud."

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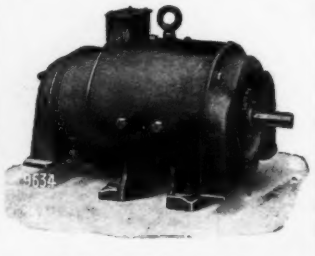

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Enclosed-ventilated D.C. Motor.

Causes of breakdown

Faulty Commutator Construction.

Probably the weakest link in the construction of a D.C. machine is the commutator, and soundness of design and of manufacture are therefore absolutely essential. The commutators of Ransomes' Motors receive unusually careful attention. Only materials of the highest class are used for segments, insulation, sleeves and rings. After assembly hydraulic pressure is applied while hot and the most rigid tests are carried out, including centrifugal ageing.

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D.C. MOTORS

Illustrated catalogue of both A.C. and D.C. machines will be sent on application. Ask also for particulars of our Motor Generator Sets, Steam-driven Generating Sets, etc.

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Electrification of the World's Oldest Railway

The Swansea and Oystermouth Line, familiarly known as the Mumbles Railway and the oldest surviving railway in the world, secured its powers in 1804. After passing from 'horse power' to steam in 1877, the system has now been electrified by the Swansea Corporation for the South Wales Transport Co.

The underground cables used in this contract were manufactured and supplied by

CALLENDER

The photograph shows a Mumbles tram at Blackpill with an old Roman Bridge in the foreground.

CALLENDER'S CABLE & CONSTRUCTION CO. LTD.
Hamilton House, Victoria Embankment, LONDON, E.C.4
Telephone, 8903 Central. Telegrams "Callender" London

Every marine engineer knows

that electrically driven auxiliaries effect great fuel economies as against steam.

that electrical plant can be made as reliable as steam

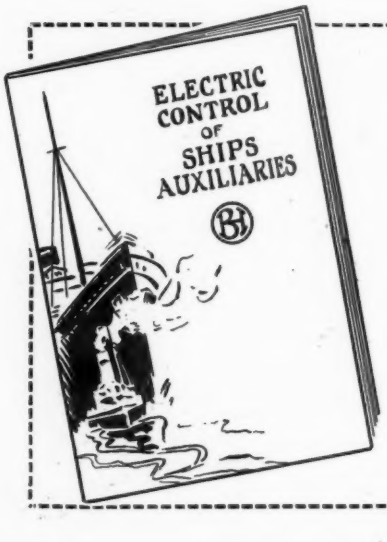
and that a big step towards reliability is to instal the recognised "marine" control gear—"Brookhirst."

but *did* you know —

that Brookhirst "Marine Type" Control gear has been considerably improved recently ?

and that these improvements and some recent installations are shown in a new publication just published ?

fill in this form !



To BROOKHIRST SWITCHGEAR LTD.,
CHESTER.

Please send me this Booklet, No. 283 C.

Signature.....

Firm.....

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Address.....

.....

BROOKHIRST SWITCHGEAR

CHESTER.

BAILEY'S "TELL-TALE"
RECORDERS
FOR PRESSURE AND VACUUM.
Indicate and record Steam, Air, Gas and Water Pressure at any distance from the source of pressure.

Air Compressors, Vacuum Pumps, Lubricators, Valves and Cocks, Boiler Fittings, &c.

ESTABLISHED 1839.

Sir W. H. BAILEY & Co., Ltd.,
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SELL US YOUR
Battery Plates & Peroxide
PROMPT SETTLEMENT

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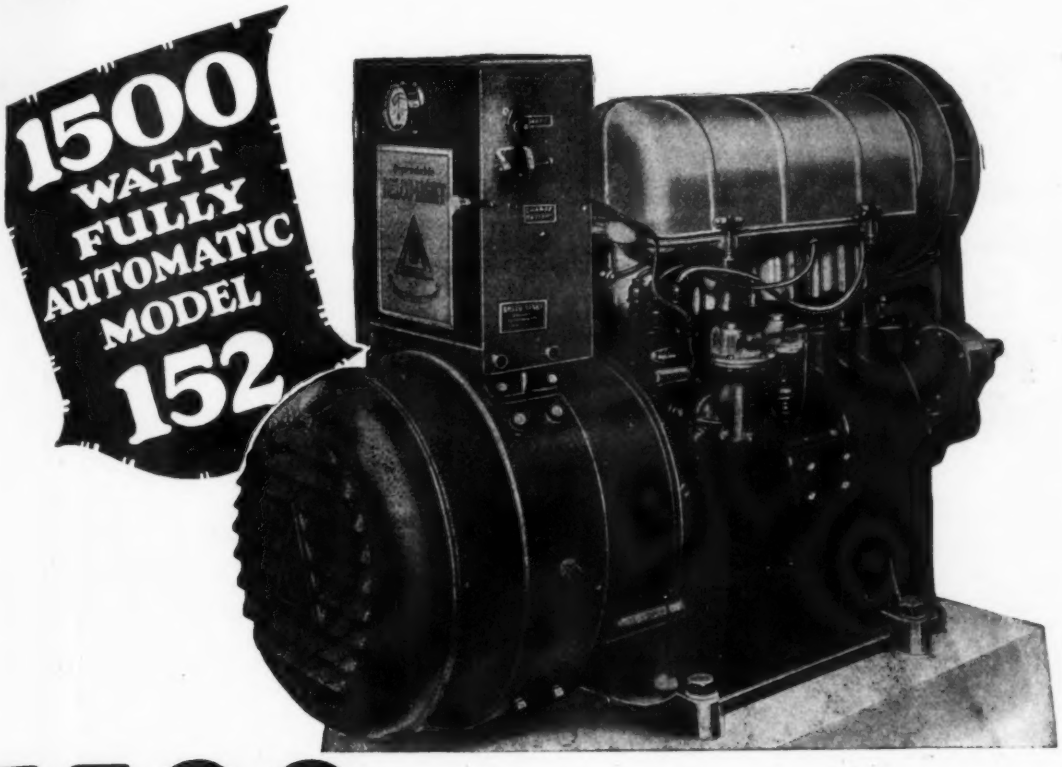
SMELTERS & REFINERS
BEDMINSTER SMELTING WORKS • BRISTOL
TELEPHONE 8080 (3 LINES) TELEGRAMS "PASS BRISTOL"



1500 WATTS — of Dependable-Economical Power

Here is a POWER and LIGHTING Plant, generating a load of 1500 watts—sufficient for every requirement of home, farm, dairy and business—that is automatic even in its economy.

This plant does not start until the load reaches 300 watts, and when it falls to 175 watts, the plant automatically cuts out. All demands of current up to 300 watts are supplied by a 16 cell Chloride Battery, which is automatically trickle-charged. This exclusive feature reduces the running cost on small loads to a minimum and prevents unnecessary wear-and-tear, bringing down the inclusive cost of current production to 3d. a unit.

Delco-Light Model 152 starts and stops automatically. It is lubricated automatically. The battery is charged automatically, and automatic warning is given of fuel shortage. Its 4 cylinder overhead valve engine is air-cooled.

All-round dependability, easy starting under all climatic conditions, trouble-free service—all these are built into this sturdy plant. And yet it is moderately priced.

You should know more about Delco-Light Model 152.

DELCO-LIGHT WATER SYSTEMS, TOO

give unfailing service, delivering an abundant stream of water when and wherever required. Full information & prices on request.

SEND THE COUPON NOW

Dependable DELCO-LIGHT

A PRODUCT OF GENERAL MOTORS.

DELCO-LIGHT
(Dept. F.10)
FRIGIDAIRE, LTD.,
Frigidaire House,
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VAUXHALL BRIDGE RD., WESTMINSTER,
LONDON, S.W.1.

Please send me full particulars of Delco-Light Model 152—

NAME.....

ADDRESS.....

.....

A B

Orders received for B.T.H. Turbo-Alternators now exceed

3,000,000 KW.

The illustration shows a 20,000 KW. (double-cylinder double flow) 3,000 R.P.M. B.T.H. Turbo-Alternator installed in the Longford Power Station of the Coventry Corporation.

The British Thomson-Houston Co., Ltd.

ELECTRICAL ENGINEERS AND MANUFACTURERS

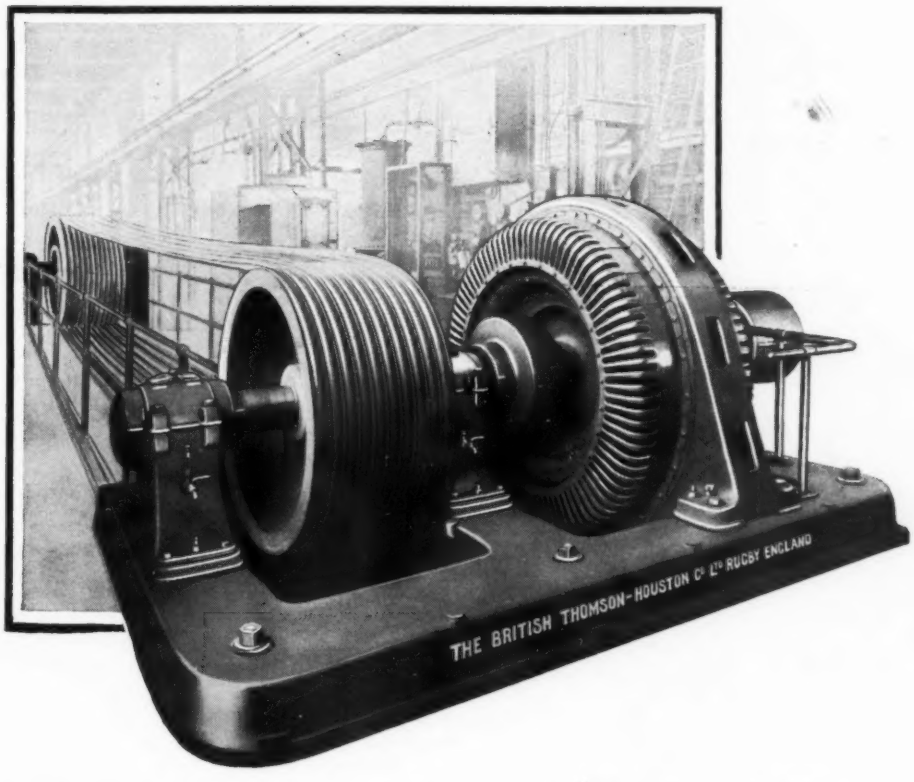
Head Office: Rugby, England. London Office: "Crown House," Aldwych.

Works: Rugby, Birmingham, Willesden, Coventry and Chesterfield.

B T-H

"No-Lag" Power-Factor Correction Motors

TRADE MARK



360 H.P. Motor
driving
Special Tube Mill.

Higher Power Factor—Lower Power Bill

NOT LONG AGO "power factor" was an unknown quantity to the average motor user. To-day everyone realizes that low power factor means uneconomical generation and distribution—and the burden falls on the power user ultimately.

A "NO-LAG" MOTOR can be arranged to run at any desired power factor or to effect any degree of power factor improvement. Every duty within the scope of the ordinary induction motor can be performed by it without *any* additional complication.

A DEFINITE REDUCTION in the power bill can be effected in many cases, by installing "No-Lag" motors, due to the substantial rebates offered by many Supply Authorities, while to the user who generates his own power, they effect substantial economies by improving the capacity of his generating and distributing plant.

The British Thomson-Houston Co., Ltd.

ELECTRICAL ENGINEERS AND MANUFACTURERS

Head Office: Rugby, England. London Office: "Crown House," Aldwych.

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B T-H

VERTICAL SPINDLE MOTORS

for

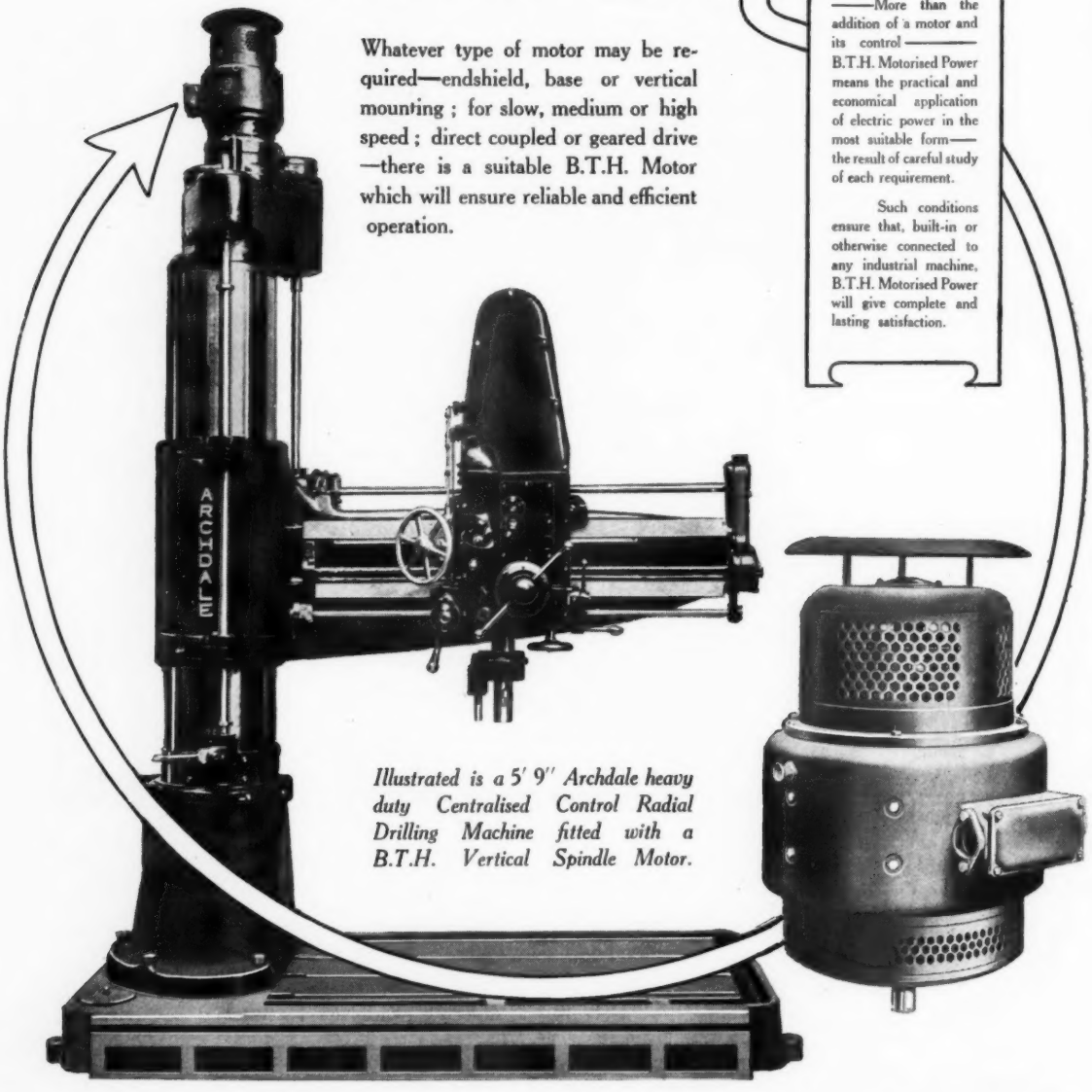
Machine Tools

B.T.H. MOTORISED POWER

——More than the addition of a motor and its control ——— B.T.H. Motorised Power means the practical and economical application of electric power in the most suitable form—— the result of careful study of each requirement.

Such conditions ensure that, built-in or otherwise connected to any industrial machine, B.T.H. Motorised Power will give complete and lasting satisfaction.

Whatever type of motor may be required—endshield, base or vertical mounting; for slow, medium or high speed; direct coupled or geared drive —there is a suitable B.T.H. Motor which will ensure reliable and efficient operation.



Illustrated is a 5′ 9″ Archdale heavy duty Centralised Control Radial Drilling Machine fitted with a B.T.H. Vertical Spindle Motor.

The British Thomson-Houston Co., Ltd.

ELECTRICAL ENGINEERS AND MANUFACTURERS

Head Office: Rugby, England. London Office: "Crown House," Aldwych.

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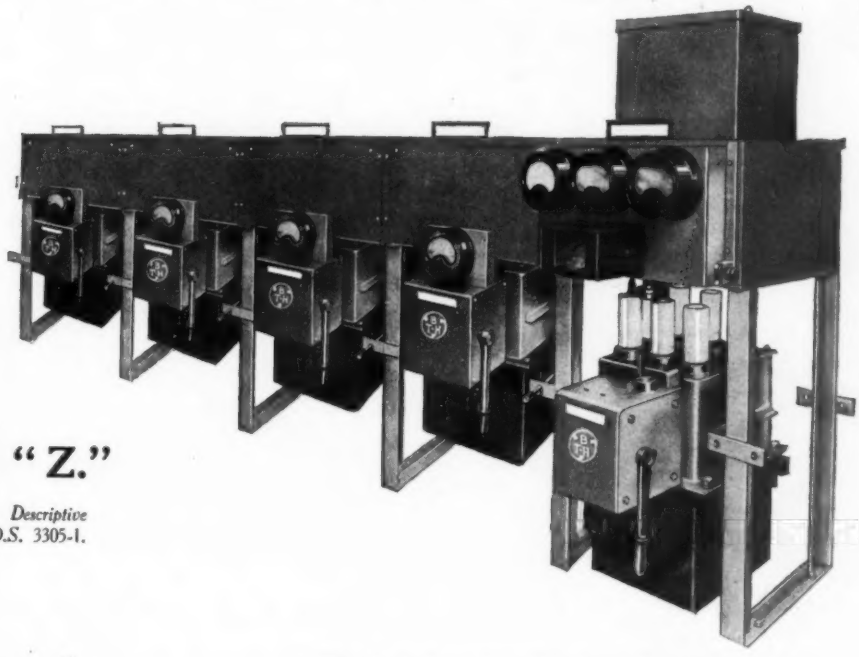
B T-H

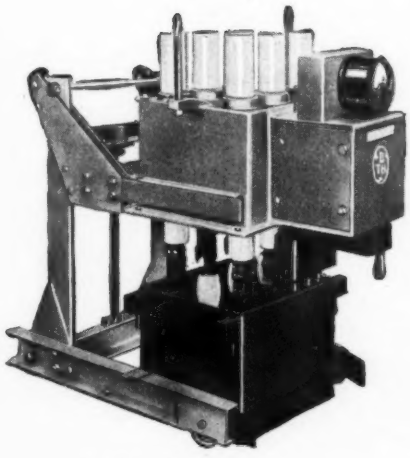
Switchgear

Metal Clad—Vertical Plugging



Class "Z."

Write for Descriptive List No. D.S. 3305-1.



Circuit breaker withdrawn and tank lowered for inspection.

Metal-clad construction is made commercially applicable for small as well as large circuits by this new design of switchgear, which has been introduced by this Company to meet all the ordinary requirements of electric power distribution at home and abroad.

Space economy has been achieved without sacrifice of safety, and the saving effected as compared with truck type switchgear, of equivalent rating, is 25% in the space necessary for installation and operation and 43% in cubic content.

It embodies the following features :

Oil or compound filling may be adopted.

No oil or compound tight joints between equipments.

Current transformers housed in circuit breaker top casing, readily accessible and interchangeable.

Voltage transformer with current limiting resistance and fuses completely inaccessible until dead and earthed.

Perfected self-aligning contacts.

Automatic interlocks to prevent inadvertent mishandling.

The British Thomson-Houston Co., Ltd.

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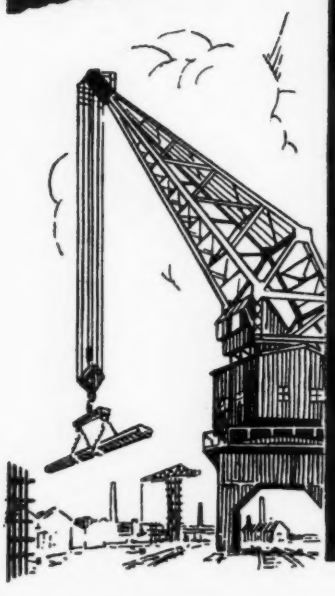
Willesden Works: Neasden Lane, London, N.W. 10

London Office: "Crown House," Aldwych, W.C. 2

"LIVERPOOL CABLES"

FOR RELIABLE Land and Marine installations!



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C. T. S. CABLES

FLEXIBLE CORDS

The LIVERPOOL ELECTRIC CABLE COMPANY LIMITED.

Phone, Bootle, 1660. Linacre Lane, Bootle, Liverpool. *Grams, Concentric, Liverpool*

Associated with

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LTD.

FREDERICK SMITH & CO.
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Put your Cables into SIMPLEX

——the Conduit with 30 years' Reputation for Uniform Quality Easy Erection Clean Threads Perfect Finish

But—— do not spoil an otherwise good installation by using cheap fittings. ¶ See that every bend, every tee, every box is SIMPLEX too, and ensure an all-round excellence.

SIMPLEX CONDUITS LIMITED,
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Branches at London, Glasgow, Manchester, Liverpool, Bristol, Newcastle, Nottingham, Leeds, Cardiff, Sheffield, Belfast, and in Overseas Dominions.

THE PIONEER

FIFTY YEARS AGO TURNER BROTHERS ASBESTOS COMPANY CONSISTED OF FIVE MEN: TO-DAY THE TURNER AND NEWALL GROUP COMPRISES EIGHT WORKS—COVERING ONE HUNDRED & FIFTY ACRES—SEVEN ASBESTOS MINES, INCLUDING THE LARGEST PRODUCING UNIT IN THE UNION OF SOUTH AFRICA, & OVER 5,000 EMPLOYEES.

"There's no sense in going further—it's the edge of cultivation."
Kipling.

IN an Industry, if it is to survive, there must always be those that give brains and capital freely in the attempt to win better and still better value for the users of their products and whose trail of progress is blazed by rejected ideas and scrapped equipment.

EBONY "SINDANYO" represents seven continuous years of scientific investigation in the laboratory, the workshop and in service; it is no accident, as are the materials it is rapidly superseding, but is to-day *exactly what we intended it to be* when first we set out to produce it, ten years ago.

There is no valid reason why any manufacturer of Switch and Control Gear should continue to mount apparatus on the *unscientific* materials that were only just good enough at the birth of the Electrical Industry and which, under to-day's conditions, are fundamentally unsound, when the use of Ebony "Sindanyo" *not only raises the standard of quality of the complete product*, but actually materially reduces the total cost of production of the unit.

One of our Engineers is at your service at all times to discuss this unique material with you.

Please write for BROCHURE No. 13.

Switchboard with Ebony "Sindanyo" Panels. *Reproduced by courtesy of The English Electric Co., Ltd.*

C.F.H.6

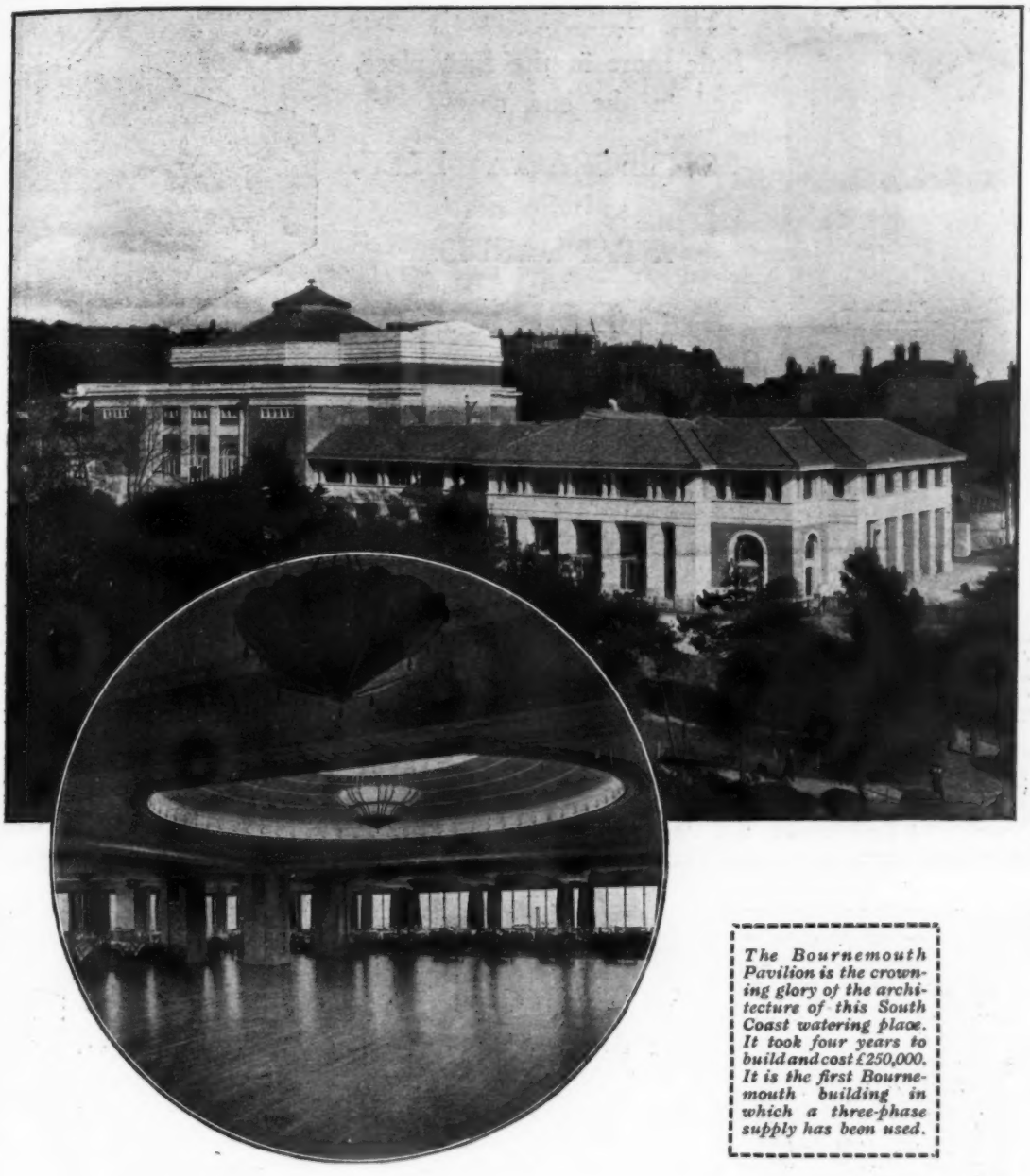
"SindanyO" REGISTERED

INSULATING BOARD.

·DIELECTRIC·HOMOGENEOUS·STRONG·

TURNER BROTHERS ASBESTOS COMPANY LTD., ROCHDALE, ENGLAND

Manufacturers of
EVERYTHING IN ASBESTOS
for the
Electrical, Electro-Chemical and Mechanical Engineering Industries



The Bournemouth Pavilion is the crowning glory of the architecture of this South Coast watering place. It took four years to build and cost £250,000. It is the first Bournemouth building in which a three-phase supply has been used.

E.C.A. Conference, Bournemouth

June 26th 27th 28th

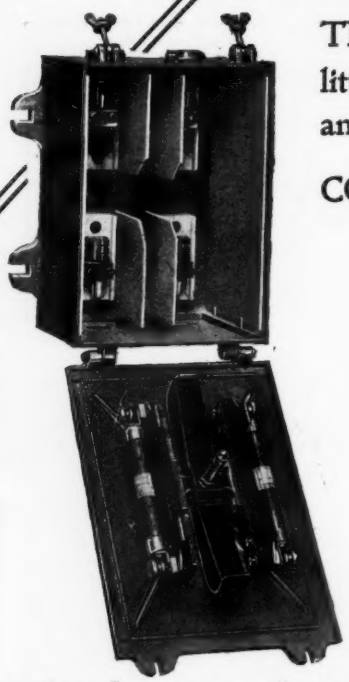
The venue for several of the important functions at this annual conference of members of the E.C.A will be the *New Pavilion* in which are installed

24 Miles of HENLEY

C.M.A.(Regd) CABLE

The giant Cunarder "AQUITANIA," which will be visited by delegates on Friday, June 28th, is the largest steamer to be built in Great Britain. She is illuminated with 13,000 lights and Henley Cables are installed throughout.

499 A



THE BEST costs but little more in the first place, and in the end costs

CONSIDERABLY LESS,

so why not STANDARDISE

BERRY'S IRONCLAD SWITCHGEAR

as separate units; and/or for making up SWITCH-BOARDS for which it has no serious rival.

If you are not already conversant with all our patterns, write for copy of our loose-leaf Switchgear Catalogue which gives full particulars with prices and dimensions.

BERRY'S ELECTRIC, (1928) LTD.

LONDON: 85 and 86, Newman Street, W.1.
BIRMINGHAM: Ironclad Works, Hall Green.
MANCHESTER: 5, Deansgate.

An **Ideal Combination** FOR INDUSTRIAL PURPOSES

MODEL 539
MINIATURE PORTABLE CURRENT TRANSFORMER.
The companion instrument to Model 528 A.C. Ammeter.

The introduction of the Model 539 Current Transformer makes it possible, for the first time, to measure A.C. currents ranging from 0·2 of an ampere to 200 amperes with small, high grade, light weight, low cost instruments.

The equipment consists of the Model 539 Transformer, weighing only 2¾ pounds, having self contained primary ranges of 2/5/10/20 amperes with inserted primary ranges of 50/100/200 amperes, with a miniature A.C. Ammeter, Model 528, having a full scale reading of one ampere.

The Model 539 has a one ampere secondary with a secondary burden of 2 volt-amperes maximum. This Transformer, in combination with the Model 528 one-ampere instrument, covers a wide and useful range of current measurements. The Transformer has a guaranteed accuracy of 1% on frequencies of 25 to 150 cycles.

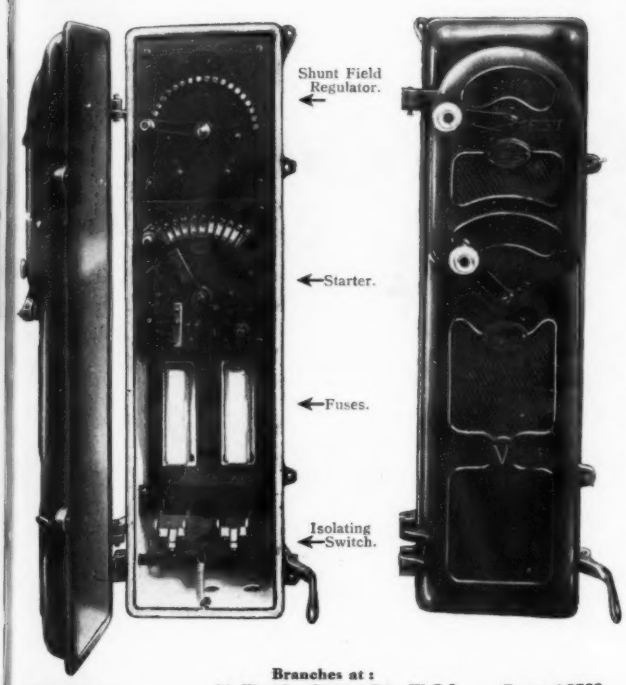
The self-contained primary ranges are changed by an unique range-changing switch, a noteworthy achievement in design which assures speed and ease of operation.

Model 539 Current Transformer, list price **£6 10s.**
Model 528 Ammeter, one ampere, list price **£3 10s.**
Model 528 Voltmeter, 150 and 15 volts, list price **£3 10s.**

WESTON
STANDARD THE WORLD OVER
Pioneers since 1888

Advt. of Weston Electrical Instrument Co., Ltd., 15, Gt. Saffron Hill, London, E.C.1.

"Efficiency at low cost."



"Aston" D.C. Motor Starting Panels have a big reputation for the highest efficiency and reliability.

The increasing demand has enabled us to produce these panels at a very low price without interfering in any way with the high quality.

The Panel illustrated is for controlling constant and variable speed motors, from ½ to 100 B.H.P.

All the necessary apparatus for control is in the form of separate standard units housed in a neat cast-iron box, dust and weatherproof. The units are easily accessible from the front and can be detached in a few minutes, should inspection be necessary, without removing the box after it has been installed.

These panels can also be supplied with Contactors in place of Fuses.

Ask Veritys to Quote!

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BCM/BHH

TUCKER TELAC

Tucker Switchboards and Switchgear Components

are made and built throughout under the expert supervision of the Tucker Technical staff.

All small components are made in our works by automatic machinery—thus ensuring absolute accuracy and inter-changeability. Component parts too large for manufacture by automatic machinery are accurately made by hand to gauge.

Like every other Tucker product these patterns will be found to conform to the highest standards of mechanical and electrical efficiency.

Enquiries are invited for L.T. switchboards both of the slate panel and ironclad unit types on skeleton angle iron framework.

Battery charge and discharge switchboards for private house installations a speciality.

The TUCKER 14 Groups comprise:—

- Tumbler Switches *Surface, Semi-recessed, Flush and Ironclad*
- Switchplates
- Sockets and Plugs *Surface, Flush & Ironclad*
- Bell Pushes
- Iron and Wood Boxes
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- Pear Switches
- Ceiling Roses
- Counterweights
- Cut-outs
- Fuse and Distributing Boards *in Teak and Iron*
- Ironclad Switches
- Ironclad Fuses
- Switchboards
- Switchgear

Tucker TELAC

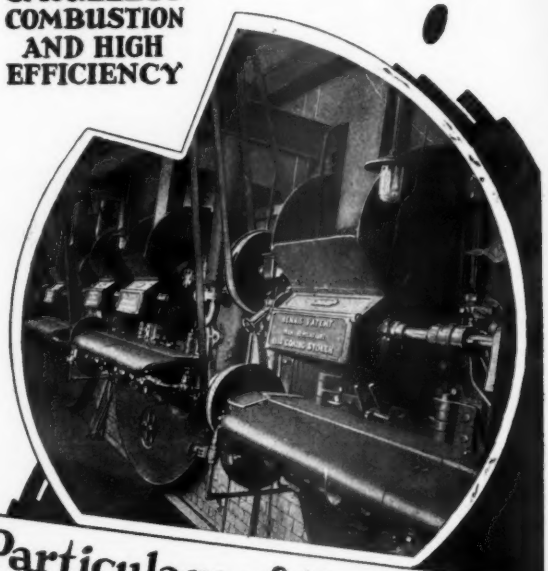
J. H. TUCKER & Co., Ltd., Kings Rd., Tyseley, Birmingham.

Successful test results from Bennis Coking Stokers!

THE illustration shows "Bennis" Coking Stokers and self-cleaning compressed air furnaces at a Paper Mill where smokeless combustion is an all-important consideration. The tests shown below are being obtained weekly and though we cannot mention the name we have permission to refer prospective purchasers to the installation.

If you are interested in smokeless combustion combined with efficiency, write for particulars to-day.

SMOKELESS COMBUSTION AND HIGH EFFICIENCY



BENNIS PATENT COKING STOKERS

ED. BENNIS & Co LTD
LITTLE HULTON
BOLTON

LONDON OFFICE:-
28 VICTORIA ST
WESTMINSTER S.W.1
Telephone:- 0627 Victoria
Telegrams:-"BENNIS Phone London"

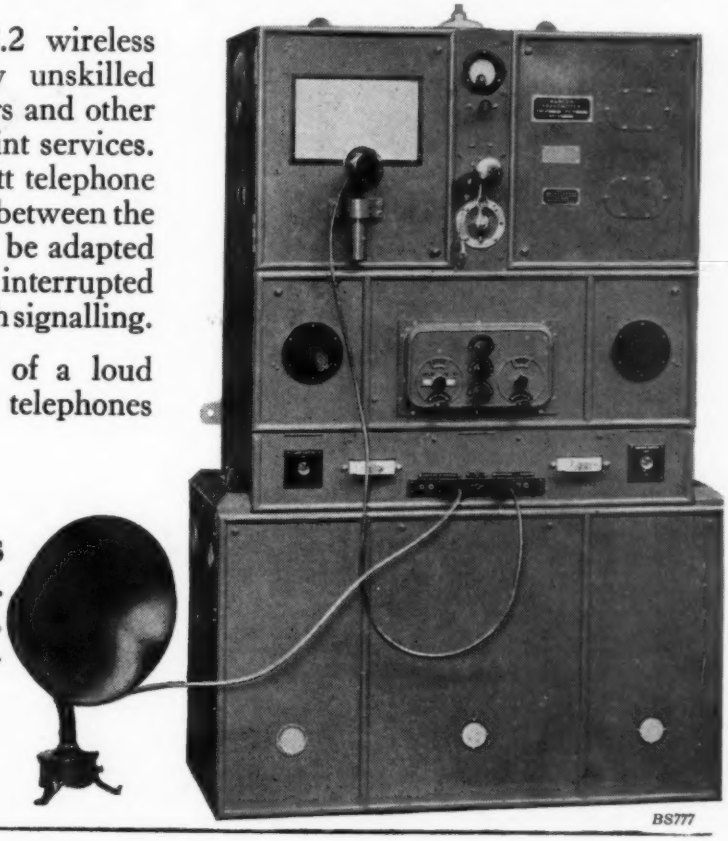
Particulars of the Tests

No. of Boilers	3 Lancashire.
Size	8′ 6″ dia. × 30′ long.
Hours Worked	136.
Total Fuel Burnt	267 tons or 598,080 lbs.
Coal Burnt per Boiler per Hour...	1,466 lbs.
Grate Area per Boiler	38 sq. ft.
Lbs. of Fuel per sq. ft. grate per hour	38 lbs.
Average Steam Pressure ...	160 lbs.
" Feed to Economiser ...	110° F.
" Added Superheat ...	100° F.
Factor of Evaporation	1·209.
Actual Evaporation per hour ...	38,000 lbs.
" " per Boiler per hour ...	12,666 lbs.
Lbs. Water per lb. coal actual...	8·6.
Evaporation per hour as from and at 212° F.	45,942 lbs.
Evaporation per Boiler per hour as from and at 212° F. ...	15,314 lbs.
Lbs. of Water per lb. Coal ...	10·4 lbs.
Calorific Value of Fuel, B.Th.U.	13,200.
Efficiency % (Boiler, Econ. Sup.)	76·4%.

MARCONI WIRELESS TELEPHONE SETS

THE Marconi Type X.M.C.2 wireless telephone set is for use by unskilled personnel on whalers, trawlers and other fishing vessels, and for point to point services. Although it is primarily a 500 watt telephone set operating on a fixed wavelength between the limits of 150 and 450 metres it can be adapted for continuous wave (C.W.) and interrupted continuous wave (I.C.W.) telegraph signalling.

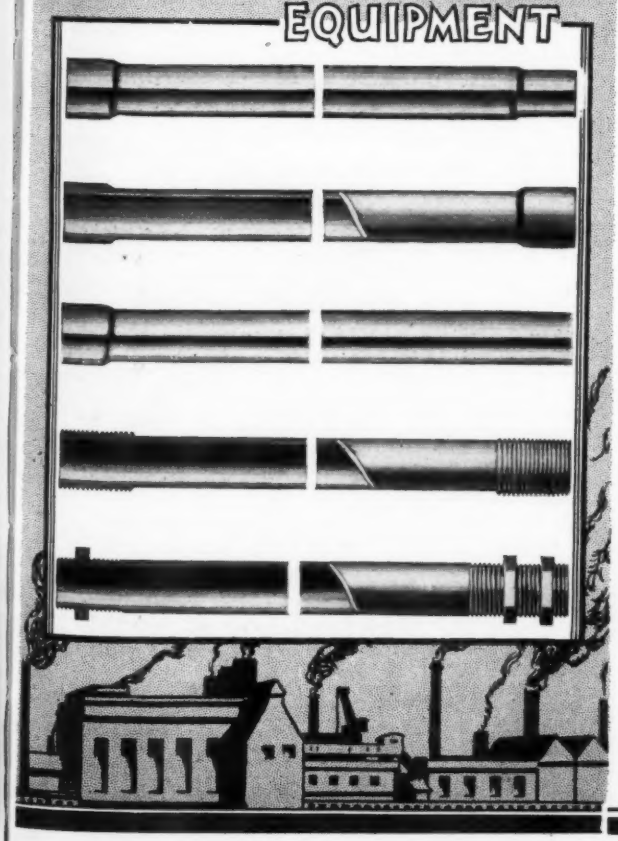
Reception is normally by means of a loud speaker, but the ordinary head telephones are also provided.



BS777

MARCONI'S WIRELESS TELEGRAPH CO., LTD.
MARCONI HOUSE,
STRAND, LONDON, W.C.2.

TUBES FOR POWER STATION EQUIPMENT



We specialize in Hot Rolled Weldless Steel Boiler Tubes, Steam Mains, Superheaters, etc., and can give quick delivery of large quantities of Boiler Tubes for re-tubing Power Station Boilers, etc.

The illustrations show types of Boiler and Stay Tubes used for standard practice, but we are continually manufacturing to suit special conditions.

We supply in accordance with the specifications of the British Admiralty, Lloyds, Board of Trade, British Corporation, Insurance Companies, etc., etc.

BROMFORD
TUBE Co LTD

BIRMINGHAM

Telephone: OFFICES: EAST 1101 WORKS: EAST 1311

Telegrams: Tubrom, Birmingham.

The Lamp that attracts attention—

Whilst glareless lighting is now universally recognised as an enormous advance on the employment of the clear glass lamp, and our Pearl lamps discreetly hide the glare of the filament — we particularly recommend

CRYSELCO

Gasfilled OPAL LAMPS

— The Ultimate in Glareless Lighting

because the famous two-skin construction not only ensures a brilliant white light with a gently diffused radiance, but means actually less deterioration in use. That is why they attract such wide attention.

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BRISTOL: All Saints' Chambers, 41, High Street.
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MANCHESTER: Douglas Chambers, 63, Corporation St.
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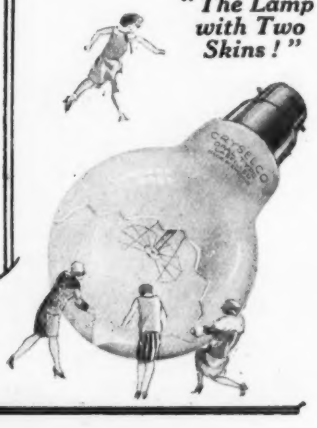
CRYSELCO LTD.
Kempston Works, BEDFORD.
Grams.: Cryselco, Kempston.
Telephone: Bedford 3277/8.

"The Lamp with Two Skins!"



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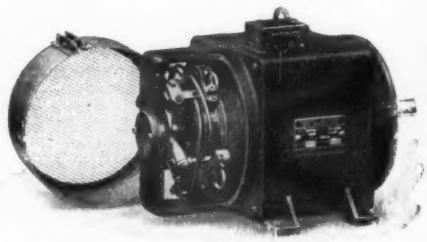
"VICTORY" D.C. MOTORS & GENERATORS



ASTOUNDING REDUCTIONS IN SIZE AND WEIGHT OF D.C. MACHINES.

With Higher Efficiency and Better Accessibility.

Compare these Figures and Send for our List.

H.P.	R.P.M.	HEIGHT.	LENGTH.	WIDTH.	WEIGHT.
2¾	1100	12¼	18⅜	9¼	140 lbs.
5	1100	13½	19¾	10⅜	200 ,,
10	1100	15½	24	12¼	300 ,,
20	1000	17½	30	14¼	500 ,,

Strictly to B.E.S.A. Temperature Rise.

"VICTORY" DYNAMOS & MOTORS, LTD.,
DAVID STREET, :: LEEDS.

CONTROL GEAR *for* CINEMA CURTAINS

Positive Action—no slipping.

The Control is worked by the operator from the Bioscope room by means of a two-way push button switch. A ¼ h.p. motor, coupled direct to worm and gear, assures non-slip and positive action. The curtain travelling track, of substantial design, suitable for light or heavy curtains, is included. We manufacture Electrical Effects for Theatre, Cinema and Ballroom. British Made throughout.

Fully illustrated catalogue sent on request.

AUSTIN WALTERS & SON, LTD

GAYTHORN ELECTRIC WORKS,

Telephone: 4109 CENTRAL. **MANCHESTER** ***Telegrams: "OHMIC," MANCHESTER.***

Heating and Ventilating

EVERY Sirocco Heating and Ventilating Equipment is carefully designed to suit the building to which it is applied—Fan and duct-work amply proportioned to supply and distribute a generous measure of air to every spot; a Heater to maintain a comfortable temperature on cold days; a washer to cleanse the air and render it fresh and invigorating.

TRADE SIROCCO MARK

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"Zapon" Enamel is a cellulose lacquer especially suitable for electrical equipment. Whether applied by spray, brush or dipping, it forms a hard tough skin on the metal which is impervious to moisture or the chemicals of the atmosphere, does not discolour in the sun or in moderate heat, and yet does not dull the brightest surface.

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Electrical Review.

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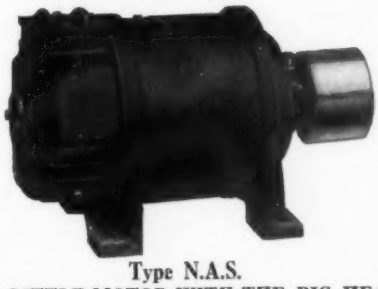

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"THE LITTLE MOTOR WITH THE BIG HEART."
¼ - ⅓ & ½ H.P.
A.C. & D.C.
INTERCHANGEABLE MOTORS.
HIGH TORQUE.
SILENT RUNNING.
KEEN PRICE.
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T.C.C. Transmitting Condensers.

The Condenser illustrated above has a capacity of ·001 mfd., and is required to work at 7,000 volts and to pass 65 amps. at 200 metres. It is of the oil immersed type.

Condensers for all purposes including: Power Factor Improvements, Wireless Reception, Smoothing, Telegraphy.

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1	-	-	7	6	5	- -	24	6
2	-	-	10	0	6	- -	28	6
4	-	-	19	4				
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1 mfd.	-	-	-	-	-	-	£1	8 0
2 mfd.	-	-	-	-	-	-	£2	10 0
4 mfd.	-	-	-	-	-	-	£4	17 6

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Recent correspondence in the electrical journals has emphasized the weakness in design of electric cooker ovens without provision for "bottom" heat. The popularity of Cosmos Cookers is no doubt in part due to the fact that they have always had three-heat control of both TOP and BOTTOM oven heating.

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NOTE THE REVISED PRICES (*with tubular type grill elements*)

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ENCLOSED BOILING PLATES | TUBULAR TYPE GRILL ELEMENTS | PARTS EASILY INTERCHANGEABLE | INSIDE ENAMELLING OF CASING

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Efficiency with Economy

Vibration Proof
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40 WATT BRACKET FITTING WITH OR WITHOUT BRASS GUARD AND LOCKING DEVICE.

40 WATT PENDANT FITTING WITH OR WITHOUT BRASS GUARD AND LOCKING DEVICE.

150 WATT GUARDED FITTING WITH CLEAR WELL GLASS.

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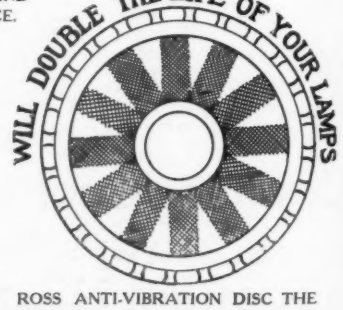
All fittings can be supplied with Looping-in Base and Anti-Vibration Lamp Discs.



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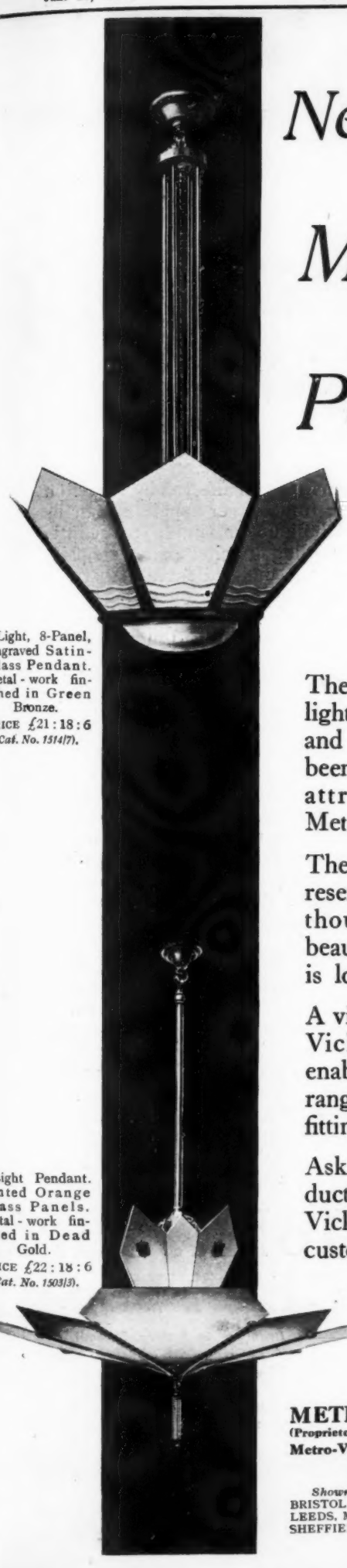

4-Light, 8-Panel, Engraved Satin-Glass Pendant. Metal-work finished in Green Bronze.
PRICE £21 : 18 : 6
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6-Light Pendant. Tinted Orange Glass Panels. Metal-work finished in Dead Gold.
PRICE £22 : 18 : 6
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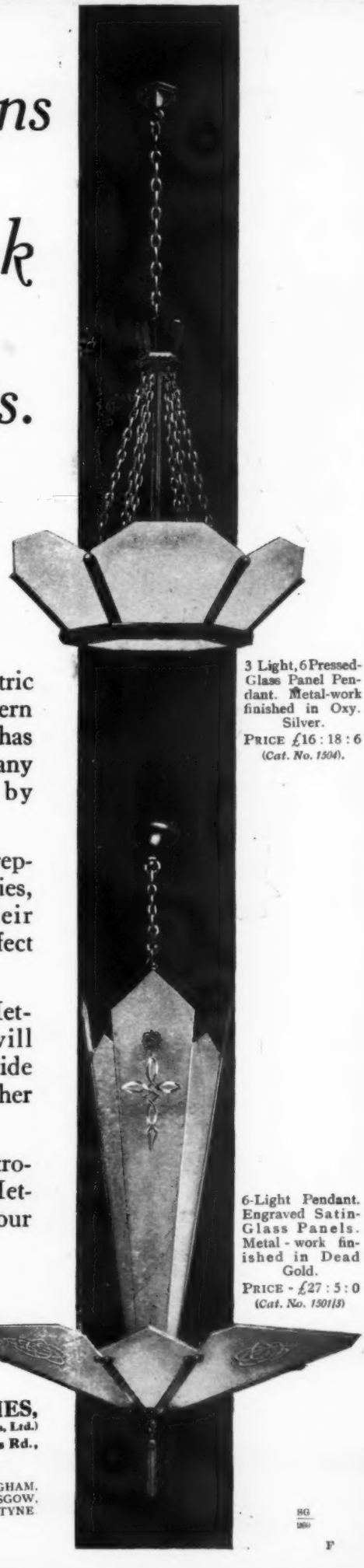
The demand for electric light fittings in the modern and futuristic styles has been well met by many attractive designs by Metro-Vick Supplies.

The illustrations are representative of this series, though much of their beauty and lighting effect is lost on paper.

A visit to our local Met-Vick Showroom will enable you to see a wide range of these and other fittings in actual use.

Ask also for book of introduction tickets to the Met-Vick Showroom for your customers' use.



3 Light, 6 Pressed-Glass Panel Pendant. Metal-work finished in Oxy. Silver.
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6-Light Pendant. Engraved Satin-Glass Panels. Metal-work finished in Dead Gold.
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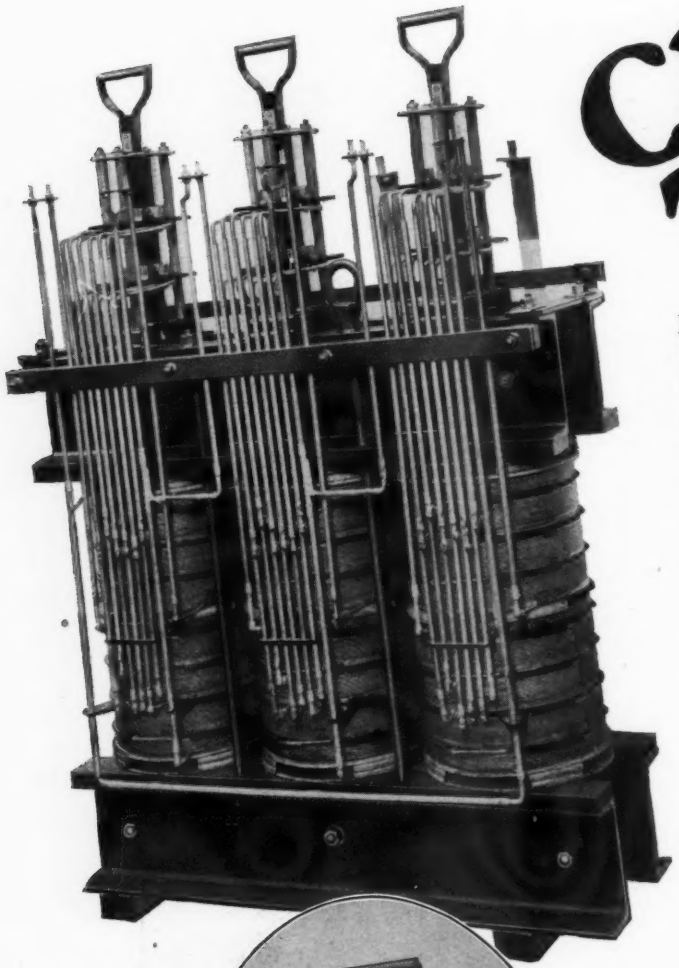
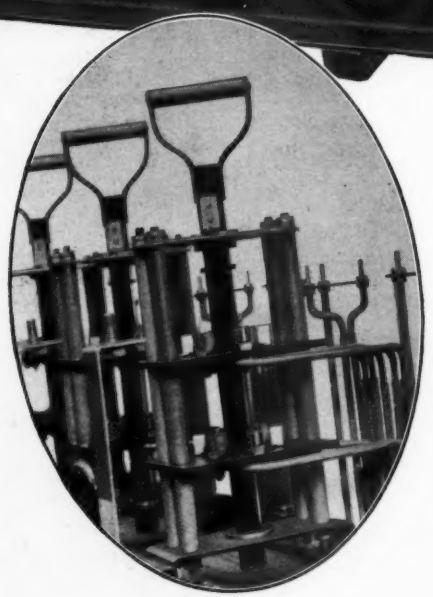
ONE OF THE J.&P. PAGES





Changing Taps

Pressure adjustments in an electrical network, affected by changing over transformer tappings, can be a laborious or simple procedure, according to circumstances. Nothing is more calculated to ruffle the serenity of the operating engineer than frequently to have to change over transformer tappings when the process involves groping about under oil for nuts and links.

The accompanying photographs show one of a number of similar transformers supplied to a large overseas customer, where this drawback has been eliminated. The transformers have double ratios and the H.T. windings are fitted with four tappings per phase, which are taken to the double no-load tapping switches shown, located above the core structure. The switches are locked in position on each step and cannot make contact between steps. The switch structure is rigid throughout, contact surfaces are liberal and the switches are designed so that it is impossible to short-circuit tapping leads. All switching takes place under oil.

Johnson & Charlton,

Branches in Sydney, Melbourne, Wellington, Johannesburg, Durban, Ipoh, Bombay and Calcutta.

THE MARK THAT MEANS THAT "LITTLE MORE" IN QUALITY

CABLES OVERHEAD LINES SWITCHGEAR TRANSFORMERS

ONE OF THE J.&P. PAGES

Changing Mary

Here is a reproduction of Episode IV of "Episodes at Elmdene," dealing, as you may see, with a topic of perennial poignancy, and using it as a powerful argument in favour of electricity, and incidentally of the

J. & P. Wiring System.

Like the other arguments in this unique propaganda booklet, it cannot fail to get right home to those who read it, and you will agree when you see a copy that this is a book which will certainly be read from cover to cover.

Husbands who do not want to place an order with you would be well advised to keep it out of the house.

Send for a specimen at once, and then order a supply overprinted with your name and address, for distribution to every non-electric home in your district.

IV.

He: "*Mary* has given notice? Just after I had stopped calling her Kate! And Kate left before I had stopped calling her Jane. But, seriously, Pamela, what is the matter with them? Is this house regarded as a vacation training centre, or are you on the black list, or what?"

She: (resignedly) — "Oh, nothing like that. I can produce excellent testimonials from the whole battalion of them. They all sympathise with me. It's just the work."

He: "Ah! I thought there was some dark secret. Of course, if you ask them to *work* . . . . . "

She: "They have such an easy time in those new houses in Laurel Park. Electric light, electric irons, vacuum cleaners — "

He: "I wonder people there need maids at all."

She: "Many of them don't. But certainly those who do need servants find it easier to keep them."

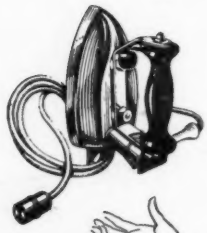
6

Phillips, Ltd., London, S.E.7.

Branches in London (Aldwych), Birmingham, Bristol, Cardiff, Derby, Glasgow, Ipswich, Liverpool, Manchester, Newcastle, Portsmouth and Belfast.

THE MARK THAT MEANS THAT "LITTLE MORE" IN QUALITY

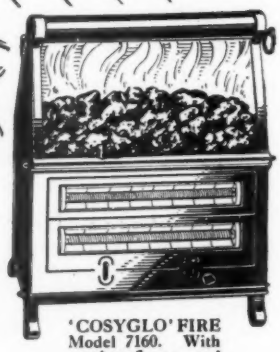
CABLES OVERHEAD LINES SWITCHGEAR TRANSFORMERS



No. 1 IRON
With life guarantee and side entry connector. With flex and adaptor - 15/6
Weight 5lbs

Keep Pace *with the* Spirit *of* Progress

Recommend



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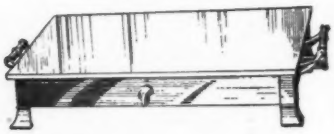

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to all Electrical Users

SAFETY KETTLE.
Elements cannot burn out. Price from 29/-

MILK WARMER.
One Pint capacity, with heat insulating handle.
Price 30/-

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By L. E. WOOD, A.M.I.E.E.

This well-known treatise has now been brought entirely up-to-date and deals with single-, two- and three-phase machines together with their starting gear. The whole subject is dealt with in a very practical way, and the book should be in the hands of every Engineer whose duties involve the installation or running of induction motors.

158 Pages. :: 106 Figures.

CONTENTS: General Principles. Single-Phase, Squirrel-Cage and Slip-Ring Motors. Tork Motors. Repulsion Start Motors. Two-Phase Motors, Windings and Starters. Three-Phase Motors, Types of Windings, Insulation, Re-connecting and Testing. Construction of Rotors and Mechanical Parts. Special Types of Induction Motors. Starting Switches of Various Kinds. Power Factor. Earthing. Troubles and their Remedies.

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SUGGESTIONS FOR DEALING WITH APPARENT DEATH FROM ELECTRIC SHOCK.

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For the Installation and Use of Electricity in Factories, &c., now read as follows :—

"Instructions as to the treatment of persons suffering from electric shock shall be affixed in all premises where electrical energy is used other than at low pressure, generated or transformed above low pressure, and in any premises at low pressure in which the Home Office directs that they shall be affixed."

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Twenty years' specialised experience is embodied in the design of "Empire" Contactors. A complete range is standardised from 25 to 500 amperes for all standard voltages and periodicities. They are simple and robust in design, and suitable for the most severe conditions of service.

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EMPIRE ELECTRIC CONTROL

IT IS HARDLY CREDIBLE THAT MANY JOINT BOX COMPOUNDS FROM WHICH CONSISTENT AND RELIABLE SERVICE IS ESSENTIAL TO PREVENT EXPENSIVE BREAKDOWNS ON THE MAINS NETWORK, ARE BOUGHT WITHOUT ANY GUARANTEE AS TO THEIR SUITABILITY AND PURELY ON PRICE YET SUCH IS THE FACT WHICH BRINGS US TO OUR POINT.

BUY ONLY TESTED AND GUARANTEED JOINT BOX COMPOUNDS THEY ARE CHEAPER IN THE LONG RUN.

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Stock of an Electrical Goods Factor, including—

500 coils various V.I.R. Cable, C.T.S. Cable, Cotton and Silk Covered Flex, Workshop Flex, Single, Twin and Triple Bell Wire, Bells, Switches, 250 coils Lead Covered Cable, 5-amp. Switches, 2- and 3-way Switches, Ceiling Roses, Bell Boards, Bells, Vacuum Cleaners, Fans, Irons, Instruments, Instrument Wire, 5- and 10-amp. Switch and Fuseboards, by G.E.C., Revo, Tucker, &c.

On view day previous and morning of Sale.

Catalogues from the Auctioneer, 129, Newington Causeway, S.E.1. 2000

SITUATIONS VACANT.

Latest time for receiving, 5 p.m. Tuesday.

If letters are not to be delivered to certain firms or individuals (if known), instructions to that effect should be sent to the Manager of the ELECTRICAL REVIEW, who will do his best to carry out such instructions. Letters of applicants cannot in such cases be returned to them, nor can the names of Advertisers using a number in any way be disclosed.

Original Testimonials should never be sent.

COUNTY BOROUGH OF WEST HAM.

Appointment of Electrical Engineer and Manager.

THE Council of the County Borough of West Ham invite applications for the position of Engineer and Manager of their Electricity Undertaking.

Candidates must have had considerable experience in connection with large electricity supply undertakings, including sales and wiring departments, and a sound knowledge of the commercial management of such undertakings. He will be entirely responsible also for advising on and carrying out all extensions to plant and mains, and such other duties as are appropriate to the management of an electricity undertaking. The successful candidate will be required to devote his whole time to the duties of the office.

The salary will be at the rate of £1,750 per annum, with advancement to the appropriate grade of the A.M.E.E. scale in operation at the end of two years satisfactory service. Housing accommodation, on terms, is available if desired. Canvassing is strictly prohibited.

The appointment will be subject to the provisions of the Local Government and Other Officers' Superannuation Act, and to a medical examination for the purposes of that Act, and the statutory contributions to the Superannuation Fund will be deducted from the salary.

Applications, on forms which may be obtained from the undersigned, accompanied by copies of three recent testimonials, must be returned not later than 12 noon on Saturday, 13th July, 1929.

GEORGE E. HILLEARY,
Town Clerk.

Town Hall, West Ham,
27th June, 1929. 2012

SITUATIONS VACANT.—*Continued.*

ASSISTANT EXPERIMENTAL OFFICER.

REQUIRED, for Government Experimental Establishment at Biggin Hill, Kent, an Assistant Experimental Officer for design duties. Candidates should have at least 10 years' experience in a supervisory capacity in a general engineering workshop, also some experience in the design of naval or military field equipment. They must have a knowledge of acoustical engineering and the manufacture of acoustical instruments, also of electrical engineering, particularly of electrical control systems, relays, and arc lamps. They must have some experience in a drawing office. Salary, £250, rising by increments of £15 to £350, with Civil Service bonus in addition. Entry will be made at the bottom of the scale, the bonus on which is at present approximately £111. Preference to ex-Service candidates.—Application, giving age, qualifications, copies of testimonials, &c., should be made by letter to the Secretary, R. E. Board, 14, Grosvenor Gardens, London, S.W.1. 1967

COUNTY COUNCIL OF DUMFRIES.

Gretna and Dornock Electricity.

THE Council require the services of an Electrical Engineer whose duties will include (1) supervision of the reconditioning of plant formerly used for the distribution of electricity in the Gretna and Dornock districts, (2) the erection of additional plant, and (3) the management, under the Council, of electricity supply in the area to which the Gretna and Dornock Electricity Order applies.

Experience of high-voltage transmission and distribution at 400/230 volts essential. Age not exceeding 32 years. Salary £400 per annum. Three years agreement. Further particulars and conditions from undersigned, with whom applications on prescribed form must be lodged on or before 5th July.

JOHN ROBSON,
County Clerk.

County Buildings,
Dumfries, 19th June, 1929. 1949

COUNTY BOROUGH OF PRESTON.

Electricity Department.

APPLICATIONS are invited for the post of Female Canvasser-Demonstrator. Experience with electrical apparatus, including cookers, and a thorough knowledge of cooking essential.

Commencing salary £3 per week.

Canvassing members of the Council, either directly or indirectly, will be deemed a disqualification.

Applications, endorsed "Canvasser-Demonstrator," stating age, experience, and present position, accompanied by copies of not more than three testimonials, to be sent to the Borough Electrical Engineer, 40-41, Lune Street, Preston, not later than 9 a.m. on Wednesday, July 3rd, 1929.

ALFRED HOWARTH,
Town Clerk.

Town Hall, Preston,
19th June, 1929. 1956

BOROUGH OF CHELTENHAM.

Electricity Department.

DOMESTIC SUPPLY.

APPLICATIONS are invited for the position of Lady Demonstrator of electric cooking and other domestic appliances in the above department. Candidates must have had a good general education, and must possess a knowledge of cooking and of domestic electric appliances, and be competent to canvass for, demonstrate, and advise on the use of electric appliances.

Commencing salary £208 per annum.

Schedule of duties and application forms can be obtained from the undersigned. Application forms, with copies of testimonials, must be returned to the undersigned not later than Thursday, the 11th July, 1929.

WALTER J. BACHE, M.I.E.E.,
Borough Electrical Engineer.

Municipal Offices, Cheltenham,
25th June, 1929. 1998

THE LANCASHIRE ELECTRIC POWER COMPANY.

Charge Engineers.

THE above company have vacancies for two Charge Engineers at their Radcliffe Power Station. Salary, Grade 8, Class H.

Applications should be sent immediately to the

RESIDENT ENGINEER,
The Lancashire Electric Power Company,
Radcliffe, Lancs.

1959

SITUATIONS VACANT.—*Continued.*

BOROUGH OF BASINGSTOKE.

Electricity Department.

APPLICATIONS are invited for the position of Assistant Engineer in the Electricity Department of the Corporation.

Applicants must be British subjects, under the age of 35 years, and have had experience in the operation and maintenance of Diesel engines, direct and alternating current machinery, and distribution. Salary £300 per annum.

Applications in candidate's own handwriting, stating age, education, Diesel engine experience, technical qualifications, and experience, &c., together with copies of three recent testimonials, must be forwarded to the undersigned in sealed envelope, endorsed "Assistant Engineer," not later than 9 a.m. on Tuesday, the 2nd July, 1929.

Canvassing members or officers of the Council, directly or indirectly, will disqualify.

F. H. SMITH,
Town Clerk.

Municipal Buildings,
Basingstoke, 17th June, 1929. 1921

BRADFORD EDUCATION COMMITTEE.

TECHNICAL COLLEGE.

APPLICATIONS are invited for appointment as Assistant Lecturer in Electrical Engineering in the College.

Salary according to the Burnham Scale, which is from £186 to £480 per annum. Commencing salary according to qualifications and experience.

Further particulars of the appointment and forms of application may be obtained from the Director of Education, Town Hall, Bradford, and completed forms should be returned to the Principal of the College not later than 10th July, 1929.

THOS. BOYCE,
Director of Education.

1958

SALESMEN.

FERGUSON, Pailin, Ltd., Higher Openshaw, Manchester, invite applications for positions as Salesmen. Switchgear specialists who have had technical training, works, drawing office, and estimating experience will be considered, even though they have had no previous sales experience.—Apply (in writing only), stating age, experience, and salary required. 1960

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.). Three consecutive Insertions for the price of two, if ordered and prepaid with first insertion. Box Number and ELECTRICAL REVIEW address count as seven words.

A JUNIOR Assistant for switchgear test house; experience with modern types of measuring instruments essential.—Reply, 1969, Electrical Review, 4, Ludgate Hill, London.

ASSISTANT Electrical Designer required for Scotland. Preference given to candidates with experience in modern alternators and synchronous motors. State age, qualifications and salary required.—2010, Electrical Review, 4, Ludgate Hill, London.

AUSTRALIA.—Designing Draughtsman wanted. Thorough knowledge automatic contactor control equipment. Available September. Essential give fullest details, experience, age, training, salary required, and present position.—Write 9940, Electrical Review, 4, Ludgate Hill, London.

CLERK, book-keeping, &c. Knowledge electrical contractor's office essential.—Write, stating age, experience, and salary required, 1870, Electrical Review, 4, Ludgate Hill, London.

CLERK, junior, required in electrical engineer's office in London for follow-up order department; one with knowledge of electrical accessories, fittings, &c. Age 18-20.—Write, giving full particulars and salary required, to 9982, Electrical Review, 4, Ludgate Hill, London.

CLERK (male or female), experienced electrical trade typing, invoicing, costing, correspondence and general routine of contractor's office. State experience and wages required.—9845, Electrical Review, 4, Ludgate Hill, London.

CONTRACT Department Manager required for West London district by manufacturers of small electrical parts and accessories. Only first class men with commercial and practical experience need apply.—Write, stating age, experience, and salary required, to "Contract," c/o Bernard Smith Advertising Service, Ltd., British Columbia House, 1-3, Regent Street, London, S.W.1. 1948

DRAKE & Gorham Wholesale, Ltd., require a Manager for their Dublin branch. Irishman preferred with personal connection in the Free State. Payment by salary and commission.—Apply R.W.S., Drake & Gorham Wholesale, Ltd., 67, Long Acre, W.C.2. 2009

SITUATIONS VACANT.—*Continued.*

DRAUGHTSMAN and Tool Designer for bakelite moulds required. Permanency for suitable man.—Solidite and Synthetic Mouldings, Ltd., Albion Works, North Street, Clapham, S.W.4. 1882

DRAUGHTSMAN for power transformer work required by the British Electric Transformer Co., Ltd., Hayes, Middlesex, to whom applicants should state age and experience, and salary required. 1816

DRAUGHTSMAN required for d.c. and a.c. switchgear. Admiralty and Marine experience preferred.—State age, experience, and salary required, to Brookhirst Switchgear, Ltd., Northgate Works, Chester. 1989

DRAUGHTSMAN required for switchgear, h.t. and l.t. layout, steel cubicles, kiosks, &c.—Apply, stating age, experience, salary required, to Crompton Parkinson, Chelmsford, Essex. 1952

DRAUGHTSMAN required immediately for d.c. and a.c. machines; speed and accuracy essential, knowledge of Admiralty requirements an advantage.—Write, stating age, experience, and salary required, to 1961, Electrical Review, 4, Ludgate Hill, London.

DRAUGHTSMAN (junior), with good electrical and mechanical knowledge, required for electrical apparatus, London area. Write, stating age, experience, and salary required.—1957, Electrical Review, 4, Ludgate Hill, London.

DRAUGHTSMAN, with sound mechanical knowledge and technical training, required for radio works (Mitcham district, London).—Apply 1994, Electrical Review, 4, Ludgate Hill, London.

DRAUGHTSMAN, with experience in the design of modern sub-station and industrial oil switches of the e.h.t. type.—Reply, stating salary required, to 1968, Electrical Review, 4, Ludgate Hill, London.

DRAUGHTSMEN.—The British Thomson-Houston Co., Ltd., Rugby, has vacancies for mechanical and electrical Draughtsmen.—Apply, stating age, experience, and salary required, to Manager, Drawing Offices, B.T.H. Co., Ltd., Rugby. 1807

DRAUGHTSMEN required for high and low tension switchgear. Experience on outdoor e.h.t. gear desirable.—Apply, stating age, full experience, and salary required, to the General Electric Co., Ltd., Witton, Birmingham. 1920

DRAUGHTSMEN required for switchgear contracts; h.t. and l.t. sub-station and industrial gear.—Apply, stating experience, salary, and age, to 1953, Electrical Review, 4, Ludgate Hill, London.

DRAUGHTSMEN, experienced in a.c. and d.c. control gear. State age, full particulars, experience and technical training, and salary required.—Allen West & Co., Ltd., Brighton. 9929

ELECTRICAL Engineer, to take charge of electrical contracting department of engineering firm in West of England. Must be between 30 and 40 years of age, with technical education, and have had previous experience in management, estimating, and supervising electrical installations, country house plants, motors, &c. State all details and salary required.—9918, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL Engineer required as Manager for associated Australian company of large electrical concern, manufacturing all branches of electrical plant. Besides technical and commercial knowledge, essential that applicant shall have experience of handling large contracts and be accustomed to negotiations with Government bodies and prominent industrial concerns. State training, experience, age, salary required.—1856, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL Engineers in London require Junior Assistant in their switch and fuse department; age 18-20. Must have electrical knowledge.—Write, stating experience and salary required, to 9981, Electrical Review, 4, Ludgate Hill, London.

ELECTRICIAN.—Really capable man wanted for wiring up test board to diagrams by radio works (Mitcham district, London).—Apply 1995, Electrical Review, 4, Ludgate Hill, London.

ELECTRICIAN for Copper Mines in Cape Colony. Must be experienced, with thorough knowledge of d.c. machines and apparatus; preferably a man who has had previous experience in mining work. Should be able to rewind armatures and be familiar with use of shop machines.—2002, Electrical Review, 4, Ludgate Hill, London.

ELECTRIC Heaters.—Representatives wanted for Yorkshire, West of England, and London, on commission.—Apply 9928, Electrical Review, 4, Ludgate Hill, London.

SITUATIONS VACANT.—*Continued.*

ELECTRIC Heating and Cooking.—Practical Works Man required on production and development; good disciplinarian. Must have sound experience and good knowledge of elements, Birmingham district.—Fullest details, remuneration, when free, 9846, Electrical Review, 4, Ludgate Hill, London.

ENERGETIC young man to take over Managing Directorship of small electrical contractor's business. Salary £340. —9818, Electrical Review, 4, Ludgate Hill, London.

ENERGETIC Representative (London and suburbs), to handle several specialities on commission. Excellent prospects for the right man.—9922, Electrical Review, 4, Ludgate Hill, London.

ESTIMATING Department.—Assistant wanted in London office of large manufacturers of supplies. Thorough knowledge of accessories, industrial and decorative lighting fittings, domestic apparatus, &c., essential.—Write, stating age, experience, and salary required, to 2011, Electrical Review, 4, Ludgate Hill, London.

GENTLEMAN wanted at once to Canvass for the sale of electric refrigerators, and general household electrical apparatus. Car or motor-cycle essential. Preference given to those with similar experience. Salary and commission.—State age and experience to Advance Electrical Co., Opera House Buildings, Tunbridge Wells. 9960

GOOD Electrician Wireman. State age, rate, and detailed experience. Country district.—9889, Electrical Review, 4, Ludgate Hill, London.

INSPECTOR, first class man, to take charge of raw material inspection and radio apparatus and component for large works (Mitcham district, London).—Apply 1996, Electrical Review, 4, Ludgate Hill, London.

INSTRUMENT Makers urgently required for general high-grade work.—Apply, giving full details of experience, Smiths (MA), Cricklewood, London. 1893

LARGE Electrical Company interested in entertainment world has immediate vacancies for a number of Electrical Engineers with good knowledge of electrical amplification. Must be prepared to travel British Isles and Europe. Minimum salary £250 to start. Higher dependent on experience. Splendid opportunities of advancement. Long hours, interesting work, rapid advancement.—Write, giving age, education, experience, knowledge of languages if any, and references to 1997, Electrical Review, 4, Ludgate Hill, London.

LIFTS.—Experienced Layout Draughtsman required conversant with best practice; progressive position to man with all round knowledge.—2004, Electrical Review, 4, Ludgate Hill, London.

MAINTENANCE and Development Engineer required by West London firm of scientific, electrical, and mechanical engineers. Applicants must have held similar positions and have up-to-date theoretical and practical mechanical and electrical knowledge. Building experience an advantage.—Reply, stating age, experience and salary required, to "Engineer," c/o Bernard Smith Advertising Service, Ltd., British Columbia House, 1-3, Regent Street, London, S.W.1. 1947

MECHANIC.—Improver required for mines in South Africa. Must be familiar with shop machines, turning, and able to do general fitting.—2001, Electrical Review, 4, Ludgate Hill, London.

METROPOLITAN-Vickers Electrical Company, Ltd., Trafford Park, Manchester, requires a Designing Draughtsman for switchgear. Must be neat, quick, and accurate, and have had experience in the designing of switchgear for all voltages. State training, experience, and salary required.—Apply by letter, addressed to the Company's Employment Department, marked "Switchgear Draughtsman." 801

RATE Fixer wanted, London area. Electrical firm.—Apply, giving experience and wages required, to 1950, Electrical Review, 4, Ludgate Hill, London.

REPRESENTATIVES wanted to sell "Ostar" gasfilled lamps and other electrical goods to the trade and to large consumers. Only live men with experience and good selling abilities need apply. Good money can be earned by such men. —Apply, with particulars, 9953, Electrical Review, 4, Ludgate Hill, London.

REPRESENTATIVES required for London and provinces by a manufacturer of E.L.M.A. lamps. Excellent prospects for gentlemen with first-class connections amongst trade and large consumers; proved sales record essential.—In your application please state, in confidence, experience, age, salary required, and area covered, to 1963, Electrical Review, 4, Ludgate Hill, London.

REPRESENTATIVES required for London, Southern and Home Counties, Wales, and the West, to run the highest type of reflector lamp for industrial, street, and general lighting. Only those considered who have live connections with corporations, contractors, architects, and consulting engineers, &c., and who cover their territory by car. Liberal commission. —9935, Electrical Review, 4, Ludgate Hill, London.

SITUATIONS VACANT.—*Continued.*

REPRESENTATIVES (3), Midlands, Northumberland, North Scotland, required to sell "Ostar" gasfilled lamps to large consumers. Lamps are licensed, fully guaranteed, branded and cartoned, and subject substantial discounts. Only experienced travellers considered who can give concrete proof of live connection with works, theatres, hotels, stores, &c.—Give full particulars and terms expected to 9819, Electrical Review, 4, Ludgate Hill, London.

REQUIRED, by large company operating in the Middle East, one Assistant Electrical Engineer for electrical repair workshop. Candidates must be trained armature winders, and should have had practical experience of switchgear repairs on oil-immersed switches of both cubicle and ironclad types; also repairs to transformer windings. Preference will be given to candidates with a knowledge of instrument repairs and to those who have had control of labour. Age 25-30. Only single men need apply. Commencing salary £450 per annum. Agreement for one year, extendable to cover three years. Free passage out and home, free medical attention, free furnished bachelor quarters, but without messing.—Apply, with copies of testimonials (not returnable) to 1966, Electrical Review, 4, Ludgate Hill, London. Please quote 2690 F.S.

REQUIRED immediately, Draughtsmen, experienced in design of apparatus and equipment for automatic or manual telephone exchanges.—Write General Electric Co., Telephone Works, Stoke, Coventry. 1820

REQUIRED immediately, man, fully conversant with exhausting wireless valves, both automatic and hand pumping.—Write, stating age, experience, and salary required, to 1946, Electrical Review, 4, Ludgate Hill, London.

SALESMEN required by well-known firm of manufacturers about to put on the market a new range of electric lighting plants and pumps. Fixed area, and car supplied.—Only men with first-class connection and experience should write to 9930, Electrical Review, 4, Ludgate Hill, London.

SHORTHAND Typist required in electrical engineer's office. Must be thoroughly experienced. Remington machine.—Write, stating salary required, to 97a, Dalston Lane, E.8. 9945

TELEPHONE Engineer required for Hongkong. An assistant telephone engineer who has had experience in the working and maintenance of automatic exchanges and subscribers' instruments. Applicants must be single and under 30 years of age. Applications from married men will not be considered.—Write for terms of engagement and forms of application to the Oriental Telephone & Electric Co., Ltd., Alderman's House, Alderman's Walk, Bishopsgate, London, E.C.2. 9983

TOOL Turners, Universal Millers, Press Tool Fitters urgently required. Good wages, good prospects.—Apply, giving full details of experience, Smiths (MA), Cricklewood, London. 1892

WANTED, Representative for Kent and Sussex, calling upon leading contractors and public bodies; should have existing connection and central station experience. Preferably owning own car. Commission basis.—9947, Electrical Review, 4, Ludgate Hill, London.

WANTED, for service in South America, four first-class Cable Operators, single men, age not over 30 years. Must have good references. Three-year contract; first class passage out and home. Good prospects.—Apply All America Cables, Room 437, Bush House, Aldwych, W.C.2. 1951

WANTED, smart young Salesman to sell motor-'bus and garage equipment, also certain tramway and railway specialities; good salary and liberal commission; those with mechanical knowledge and own car preferred.—Apply in first instance to 2007, Electrical Review, 4, Ludgate Hill, London.

WANTED, Salesman, having good connection with wireless dealer, for first-class radio side line, on commission.—Particulars, 9931, Electrical Review, 4, Ludgate Hill, London.

WHOLESALE house has vacancies for smart young men to train as Outdoor Representatives. Some knowledge of electrical and radio goods essential. Applicants must be prepared to serve indoors during training period at nominal salary. Exceptional opportunity for energetic young men. London applications only.—Write, giving full details to Mr. Spencer Orgel, 92-94, Paul Street, London, E.C.2. 1808

WINDING Shop Charge Hand wanted, used to mass production of fractional horse-power motors. Give full details of experience, technical training, age, whether married or single, and salary required.—2006, Electrical Review, 4, Ludgate Hill, London.

APPOINTMENTS FILLED.

Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision. We will then insert a notice free of charge under this heading.

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TRANSMISSION Line Engineer, 5 years' experience district supervision, negotiation, layout, many miles steel cored aluminium e.h.t. lines, also copper, copper cored steel, and steel lines, pilot and telephone cable, outdoor and indoor switchgear, sub-stations, underground cable, transformers, &c., desires senior post. Highest references. Free end of June.—9853, Electrical Review, 4, Ludgate Hill, London.

CONTRACT AND SALES ENGINEER.

A CAPABLE Electrical and Mechanical Engineer, public school, college, and engineering apprenticeship, desires new appointment, where his wide contract and sales experience in connection with prime movers and electrical machinery for central generating stations, factory, mill, and colliery electrification could be utilised. Painstaking and conscientious. Excellent testimonials.—9943, Electrical Review, 4, Ludgate Hill, London.

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A COOKING and Heating Engineer, competent Works Manager, wishes make change. Expert production, design, and works routine; conversant all types of apparatus; 23 years' experience in above branch.—9969, Electrical Review, 4, Ludgate Hill, London.

A COMPETENT Works Manager desires change, wireless, gramophones, switchgear, good organiser, up-to-date in all methods of production and management. Keen, thorough, reliable. Age 39.—9968, Electrical Review, 4, Ludgate Hill, London.

ADAPTABLE Electrical Fitter and General Engineer, machine, tool, fitting, assembling, and drawing experience, 6 and 4 years same firm and year away, outside experience, age 26, single, Englishman, genuine, requires appointment abroad; any progressive proposition considered.—9814, Electrical Review, 4, Ludgate Hill, London.

ADVERTISER, capable, keen, desires progressive change; estimating, assistant to works manager, or similar capacity; 5 years' shops, 4½ years' comprehensive experience D.O., estimating departments and supervision; electric fittings, fixtures, general engineering, ship and railway metal furnishings. Good education. Age 25.—9990, Electrical Review, 4, Ludgate Hill, London.

ADVERTISER will Represent wholesale house; commission and part expenses. Glassware or accessories. Very fine connection most main towns. Own car.—9937, Electrical Review, 4, Ludgate Hill, London.

ARMATURE Winder, 9 years' experience in d.c., a.c. traction work; also experience in small work.—Treadaway, 87, Woodland Road, Southall, Middlesex. 9835

ARMATURE Winder (25), 11 years' experience, a.c., d.c., all types, large or small. Rewinds, repairs, commutators. Splendid references.—J. Hardy, 7, Bertal Road, S.W.17. 9956

ARMATURE Winder, 13 years' experience, repairs, rewinds, all types, including car starters, dynamos, maintenance.—Cobb, 11, Coliston Road, S.W.18. 9910

BOOK-Keeper, general Clerk, age 29, 12 years' experience in electrical industry, supply company and contractors, desires progressive position. Excellent references.—9885, Electrical Review, 4, Ludgate Hill, London.

CABLES.—Gentleman, many years' practical experience manufacture electric light and power cables, desires responsible post. Full details to genuine inquirers.—9856, Electrical Review, 4, Ludgate Hill, London.

CHIEF Accountant (31) desires similar post with greater scope for advancement. Fully conversant with all clerical and secretarial work of electrical undertaking. Can keep complete set of books and compile balance sheet. Excellent references.—Write 9880, Electrical Review, 4, Ludgate Hill, London.

CLERK (28) seeks situation, stores; 10 years' experience, typing, card-indexing, stock-keeping; good knowledge screws, terminals, engineers' supplies and repetition work. Excellent references.—Brown, 217, Lillie Road, Fulham, S.W.6. 9843

CLERK, six years' costing and ordering, desires progressive situation; technical knowledge. Age 22. London district.—9965, Electrical Review, 4, Ludgate Hill, London.

DRAUGHTSMAN, having had first-class training with well-known electrical firm, desires a progressive appointment. Age 20 years.—9855, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL and Mechanical Engineer, young, requires situation as Maintenance Engineer, in factory or shop. Experienced in all power and lighting installation, workshop repairs, &c.—Mitchell, 35, Stonehill Road, Chiswick, W.4. 9899

SITUATIONS WANTED.—*Continued.*

ELECTRICAL and Mechanical Engineer (36), fluent French, wishes to join concern requiring representation in France. Capital available.—9898, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL Engineer, whose home is in Rhodesia, desires post with British company operating in South Africa or Rhodesia. Three years' day course engineering, diploma, A.M.I.E.E. examination, 6 years' experience of transformers, switchgear, and converting plant, including 2 years chief tester and 1 year technical sales.—9989, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL Engineer, age 29, specialise heavy power, cranes, plant, &c., i.c., Diesel and steam experience; quick at fault finding; used to control men. Permanent progressive post, anywhere. Write appointment.—E.F., 53, Woodgrange Drive, Southend-on-Sea. 9976

ELECTRICAL Engineer, well known Leicester and county, desires appointment as Representative for firm of good standing. Other districts considered.—Engineer, 18, Melbourne Road, Leicester. 9836

ELECTRICAL Engineer (25) desires progressive post; 6 years' practical experience; also 5 years' technical training. Drawing office, electro-medical and X-ray apparatus, generating station and 'bus electrical equipment.—9973, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL Engineer requires position on power station or as Electrical Maintenance Engineer in a factory. Had experience with motor and rotary convertors, a.c. and d.c. motors and generators, and most types of instruments and switchgear made by the B.T.H. A.M.I.E.E. exam., Regent Street Polytechnic diploma.—9925, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL Engineer (28), excellent college and works record, wide experience, desires progressive position. Hard work preferred.—9829, Electrical Review, 4, Ludgate Hill, London.

ELECTRICIAN, lighting, power, bells, telephones, all systems; experienced.—B.O., The Fernery, Morden Road, Merton. 9966

ELECTRICIAN (27), fully experienced all systems and branches electrical installation work, seeks permanency. Town or country.—6, Elsley Road, S.W.11. 9988

ELECTRICIAN or Wireman's Mate wants work; ten years' electrical experience.—Ab, 56, Windermere Road, Ealing. 9951

ELECTRICIAN wants job, anywhere, all systems.—B., 119b, Anerley Road, S.E.20. 9952

ELECTRICIAN Wireman, competent workman, requires employment. Long experience all branches. References.—C., 140, Oxford Gardens, W.10. 9978

ELECTRICIAN'S Mate (20) seeks situation; 3 years' experience; town or country.—Mate, 24, Coleman Road, Camberwell, S.E.5. 9971

ELECTRICIAN (33), 15 years' all-round experience all systems, new, jobbing. Good mechanic and reliable workman.—Wells, 26, Bartholomew Villas, N.W.5. 9972

ELECTRICIAN (32), 15 years' experience, power and lighting, installations or maintenance.—9933, Electrical Review, 4, Ludgate Hill, London.

ELECTRICIAN'S Mate, age 19, seeks situation; quick and reliable.—R. Bradley, 150, Kempton Road, East Ham, E.6. 9938

ELECTRICIAN'S Mate wants job; several years' experience.—F. Summers, 44, Aycliffe Road, Shepherd's Bush, W.12. 9939

ELECTRICIAN, 5½ years with electrochemical works and laboratories, and 17 years' general experience, possessing initiative, and used to taking charge of plant, making alterations to electrical systems, wants situation. Good references.—9832, Electrical Review, 4, Ludgate Hill, London.

ELECTRICIAN, first class, supervising, estimating; thorough mechanic. Age 34. Excellent credentials.—220, Philip Lane, N.15. 9869

ELECTRICIAN, long experience, installations and repairs. Anywhere.—14, Cambrian Grove, Gravesend. 9839

ELECTRICIAN, age 34, life experience, power, lighting, &c.—Croser, 4, Cobham Road, N.22. 9857

ELECTRICIAN, 20 years' experience all systems of lighting, 'phones, and motors.—F.C., 31, Godfrey Street, Chelsea, S.W.3. 9852

ELECTRICIAN, good, all systems; anywhere; excellent references.—Weston, 133, Lupus Street, S.W.1. 9906

ELECTRICIAN Improver, 8 years' experience with all systems of lighting, power, 'phones and bells.—F.S., 34, Stavordale Road, N.5. 9917

SITUATIONS WANTED.—*Continued.*

ELECTRICIAN, experienced, lighting, power, jobbing; full or part time.—" Electric," 325, Kilburn Lane, W.9. 9923

ELECTRICIAN'S Mate (23) seeks situation, as Mate or Electrician Improver; 5 years' experience. Last job 3 years.—Goddard, 27, Orchard Road, Highgate, N.6. 9875

ENGINEER (28), experienced electric lighting and power, i.c. engines, producer gas plants, hydraulic presses and pumps, N.H.3 refrigeration, erection and repairs to machinery generally, also office experience of correspondence and drawing, desires factory or outdoor supervisory progressive post.—BM/ENRT, London, W.C.1. 9628

ENGINEER and Manager (small undertaking); last 9 years; rural areas; fully conversant with farming industry; desires post to develop rural load; interview preferred.—9876, Electrical Review, 4, Ludgate Hill, London.

ENGINEER Salesman (34), specialised experience switchgear and instruments, having connection amongst supply undertakings, consultants, and contractors in London and Home Counties. Thorough technical and commercial knowledge. Moderate salary; prospects.—9687, Electrical Review, 4, Ludgate Hill, London.

ESTIMATING, Buying and Sales Engineer (21), good experience fans, motors and motor-driven appliances.—G., 9, East Dulwich Grove, S.E.22. 9844

EX-ELECTRICAL Artificer, R.N., seeks situation on maintenance work. Thorough experience; electrical and mechanical.—Cameron, 80, Borough High Street, S.E.1. 9860

EXPERIENCE with domestic apparatus manufacturer—Birmingham or Midlands—required by technically trained student. Keen, willing worker. Moderate salary.—9847, Electrical Review, 4, Ludgate Hill, London.

FARADIAN (27), fully qualified, keen and energetic, requires a good, responsible and progressive post.—9881, Electrical Review, 4, Ludgate Hill, London.

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MANAGER, fully conversant power and lighting installation, good organiser (aged 29), 14 years' experience, seeks progressive position. Undeniable references.—9886, Electrical Review, 4, Ludgate Hill, London.

MAN (30), five years' cable-making experience, also technical knowledge wireman's electrical installation work, requires progressive position.—Jeffery, 10, Castle Road, Enfield Wash, Enfield. 9948

METER Fixer wants work; married.—A., c/o Sharpe, 42, Park Road, Uxbridge. 9964

PLUMBER-Jointer, disengaged, married; h.t. or l.t. Any district. Nine years' experience.—C., 71, Camborne Avenue, Ealing. 9900

PLUMBER-Jointer seeks position, home or abroad. Experience e.h.t., h.t., l.t., power station, all sub-station work, and mains distribution.—9942, Electrical Review, 4, Ludgate Hill, London.

PLUMBER-Jointer, h.t. and l.t. mains and service work.—9957, Electrical Review, 4, Ludgate Hill, London.

REPRESENTATIVE, with established connection in electrical trade in Home Counties, desires appointment or Agencies. Own car.—9996, Electrical Review, 4, Ludgate Hill, London.

SALES and Bought Ledger Clerk seeks situation; age 24; 8 years' experience in accounts office; excellent references.—C.J.N., 5a, Chapter Street, S.W.1. 9824

STOREKEEPING, &c.—Gentleman desires situation (26), appearance and mannerisms older. Experience: storekeeping, store recording, knowledge of chasing and order office routine.—9837, Electrical Review, 4, Ludgate Hill, London.

TEST Assistant, or good Electrician Improver (22) desires good opening. Experience on switchboard, switchgear, domestic appliances, installations, &c.—9849, Electrical Review, 4, Ludgate Hill, London.

WIREMAN and Mate seek situation; good experience all branches.—S.M., 53, Brookfield Avenue, E.17. 9850

WIREMAN, experienced and reliable, d.c. and a.c. lighting and power. Disengaged.—G.P., 16, Cantrell Road, Bow, E.3. 9944

WIREMAN, competent and reliable; good references. Just disengaged.—" Electrician," 19, Bryantwood Road, London, N.7. 9950

WIREMAN wants good class work. Any system. Full district rate.—9977, Electrical Review, 4, Ludgate Hill, London.

SITUATIONS WANTED.—*Continued.*

WIREMAN'S Mate seeks situation; experience, lighting, &c.—K. Sharp, 9, Chancellor's Road, Hammersmith. 9963

YOUNG Man (21), with good wireless knowledge, also electrical, requires situation, any capacity.—Neale, 201, St. Mark's Road, W.10. 9995

YOUNG Electrician, lighting, power, &c., installation, maintenance, repairs, all systems. 1s. 6d.—9975, Electrical Review, 4, Ludgate Hill, London.

YOUTH, smart, desires situation in engineer's drawing office.—36, Leadale Road, N.16. 9891

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9784

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Reduced Prices.

500 MOTORS, Dynamos, Transformers, all voltages and frequencies.

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Telegrams: Rheostat, West Bromwich. 16

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WE hold one of the largest Stocks of New and Second-hand Motors. Second-hand Machines are thoroughly overhauled. Inspection and Tests can be made at our Works.

For Sale or Hire. Send your inquiries to Messrs.

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CITY ROAD, LONDON, N.1.
Telephone: 5512-3 Clerkenwell. 13

10½-kW ELECTRIC GENERATING SET FOR SALE.

BELT driven; National Gas Engine; 220 volts d.c.; Switchboard, &c.
Good condition. May be seen working.
Further particulars may be obtained from The Engineer, Harrogate Gas Company, Harrogate. 1881

FOR SALE.—*Continued.*

NON-COMBINE ELECTRIC LAMPS AND ELECTRICAL SUPPLIES.

LARGEST Stockists at Lowest Prices for :—
"OSTAR" GASFILLED,
TRACTION TYPE,
CARBON FILAMENT,
METAL FILAMENT,
SIGN TYPE (B.C. & E.S.),
CANDLE,
HALF WATT TYPE (CLEAR AND OPAL),
FLASH LAMP BULBS,
AUTOMOBILE LAMPS (ALL TYPES),
and
SILVERED REFLECTORS,
VACUUM CLEANERS,
FLASHERS,
BOWL FIRES, IRONS, TOASTERS, KETTLES AND DECORATIVE LIGHTING SETS (newest designs).
We welcome your enquiries for Price Lists and Quotations, and can assure you of our Best Service.

DIRECT ELECTRIC LAMP CO., LTD.,
72, Shoe Lane, London, E.C.4.
'Phone: City 7461. 'Grams: Metalfilam, Lud, London.
9970

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THE ZENITH LAMP COMPANY,
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OWING to removal, 100,000 Lamps must be disposed of, comprising Metal Filaments, Traction, Half Watt Type, Opal, and Ostar Gasfilled Lamps.

No reasonable offer refused.

Send us your enquiry and offer.
9984

CENTURY LAMPS (LONDON), LTD.

GAS-FILLED Lamps up to 500 watt—Guaranteed non-infringing.
M.F. LAMPS,
TRACTION LAMPS,
HALF-WATT-TYPE LAMPS.

Highest quality. All sizes. Prompt delivery.

BEFORE ORDERING ELSEWHERE PLEASE OBTAIN OUR PRICES.

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MOTORS & DYNAMOS, &c., D.C. and A.C.

WE carry a large and varied stock so that most inquiries can be met at reasonable prices with quality guaranteed. Stock includes :—
Motors:—3-ph., up to 100, 150, 225, 300, 400 and 500 h.p.
Alternators.—35 kVA, 220 V and 440 V, 3-ph., 50 per.
Transformers.—3-ph., 50 per., 500/100 V, and 480/220 V.

GREENHALGH BROS., Atherton, nr. Manchester.
17

WATER-TUBE BOILERS.

WATER-Tube Boilers for Sale, with immediate delivery: "B. & W.," "Stirling," "Woodeson," &c. Sizes from 5,000 to 30,000 lb., all working pressures. All recent make, in new condition. Erected complete and guaranteed. Economisers, Generating Sets., Motors, and all Auxiliaries.—Burford, Taylor & Co., Boiler Specialists, Middlesbrough. 21

CONDENSERS.

FOR Sale, complete power factor correction Condenser Equipments by British Insulated Cables, with or without auto-transformer and switchgear, 200 volts; one 3-phase, 73 kVA, another 185 kVA; also 2-phase equipments, 98 and 197 kVA. All 600 volts, 50 cycles, suitable any voltage with transformer.—1986, Electrical Review, 4, Ludgate Hill, London.

FOR SALE.—*Continued.*

"BARKERLITE" LAMPS.

The New Improved Gasfilled Lamp.
Prices much lower than any gasfilled lamp on the market.

OUR agents say :—"Your lamps are entirely satisfactory, and we will be able to move large quantities."
"We will be able to move considerably more than you stipulate, and ask that our quota for this area may be doubled."

Factors and Agents are advised not to miss this opportunity of "BIG BUSINESS" during the coming season.
Districts still open: Glasgow, Liverpool, Leeds, and a few others.

Write for terms, prices, &c. :

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1965

LAMPS! LAMPS! LAMPS!

THE UNIVERSAL ELECTRIC LAMP CO., of Universal House, 89, Great Eastern Street, E.C.2, are able to offer GUARANTEED ELECTRIC LAMPS in ALL VOLTAGES AND WATTAGES.

Complete stocks of Ostar Gasfilled, Sign, Metal Filament, Traction, Half Watt Type (Clear, Opal and Daylight), Candle, Carbon, Autobulbs (Clear and Daylight), Natural Coloured Glass, Decoration Sets and Lamps, Flash Lamps, Wireless Valves, and guarantee you against

ANY INFRINGEMENT OF PATENT RIGHTS.

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WITH Switchgear, very cheap. Only few left. 400 volts, 3-phase, 50 periods.

60 h.p.	£60 each.
50 h.p.	£50 ,,
40 h.p.	£40 ,,
30 h.p.	£30 ,,
25 h.p.	£27 ,,
20 h.p.	£24 ,,
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By B.T.H. Co., Met. Vickers, English Electric, Westinghouse, &c., &c. All guaranteed O.K.
G.C.S. & CO., LOW LAITHES COLLIERY, WAKEFIELD.
1828

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SEVERAL unused 2,000/3,000 b.h.p. M.A.N. Diesel Engines for disposal at attractive prices.

These engines are especially suitable for dealing with peak and emergency loads in large power stations, or as the main generating sets in moderate size stations. Immediate delivery.

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SPECIAL BARGAINS.

TWO 750-kW, three-phase, 50 cycle Turbo-Alternator Sets by Rateau. Year 1924-1927.
One 1,500-kW, six-phase, 50 cycle Rotary Convertor, d.c. side 560 volts, 300 r.p.m., with oil-cooled transformer.

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1829

TO LAMP EXPORTERS AND WHOLESALERS.

ASK now our quotation for Electric Lamps (clear, Opal, Daylight). Prompt deliveries. Attractive prices for big quantities. Especially equipped for export to overseas.

THE RADIOLAMP WORKS, LTD.,
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1869

30 YEARS' GUARANTEE.

400 D.C. and a.c. Motors, London Stock.
Ring CITY ELECTRICAL CO.,
Emerald Street, W.C.1.

'Phones: Holborn 9722; Rewinds 2083 Clerkenwell. 782

FOR SALE.—*Continued.*

MYLAN & SMITH (ENGINEERS), LTD.

CHANGE OF ADDRESS.

Our Works and Offices are at Bamford, via Sheffield.

A selection from the miscellaneous section of our stock.

ELECTRIC MOTORS, A.C. AND D.C., ALL CIRCUITS.

WE have several hundreds of machines, from 5 to 500 h.p., actually in stock, at half makers' prices. Also control gear for same.

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One 40-amp. draw-out H.T. Circuit Breaker, totally enclosed, ironclad, triple-pole, oil-immersed, floor mounting, by Siemens, suitable for 50 periods, 3,000 volts, fitted with two overload and one no-volt releases. Ammeter.

One 200-amp. draw-out type Circuit Breaker, totally enclosed, ironclad, triple-pole, oil-immersed, floor mounting, by Siemens, fitted with no-volt and two overload releases. Ammeter 0/250 amps.

One 50-h.p., 440-volt Auto-Transformer Starting Panel, by Brookhirst, oil-immersed, totally enclosed, ironclad, floor mounting, fitted with no-volt and overload releases. Brand new.

One 55-h.p., 550-volt Auto-Transformer Starting Panel, by G. Ellison, oil-immersed, totally enclosed, ironclad, floor mounting, fitted with no-volt and two overload releases. Brand new.

ISOLATING SWITCHES.

Six 300-ampere, 3,300-volt Isolating Switches, single-pole, indoor knife type, arranged for front connection, and mounted on cast-iron base, by Westinghouse Co.

Six 100-ampere, 3,300-volt Isolating Switches, single-pole, indoor knife type, arranged for front connection, and mounted on cast-iron base, by B.T.H. Co.

HAULAGE GEARS.

One, electrically driven by H. C. & C. Grayson, rope speed ¼ mile per hour; motor 3-phase, 50 periods, 400/440 volts, short rated by Westinghouse Co., complete with control gear.

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One pulley type Flywheel, spoke pattern, 96-in. diameter by 28½-in. face, 7-in. bore, length of boss 18¾ in. This flywheel is of the split type; weight approximately 2¼ tons.

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(3-phase, 50 periods, oil-immersed, self-cooling.)

One 1,000 kVA, 3,300/440 volts, B.E.T. Co.

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One 200 kVA, 250 revs., 3-phase, 50 periods, 440 volts (power factor 0.8) Sandycroft Alternator, complete with direct coupled exciter on combined bedplate, and suitable for either direct coupling or belt drive.

One 100 kVA, 500 r.p.m., 3-phase, 50 periods, 550 volts, rotating field, Greenwood & Batley Alternator, separately excited.

One 80 kVA, 500 revs., 3-phase, 50 periods, 440 volts, rotating field Greenwood & Batley Alternator, separately excited.

D.C. CONTROL PANELS.

Various d.c. Control Panels, up to 100 h.p., various makes, Brookhirst, Bray, Markham & Reiss, &c., &c.

D.C. CONTROLLERS.

Numerous d.c. drum type reversing Controllers, complete with resistances, various voltages up to 25 h.p.

REDUCTION GEARS.

Numerous worm type Reduction Gears, 7½ to 50 h.p., various makes.

The above represents only a small selection of our stock. Please send us your enquiries.

MYLAN & SMITH (ENGINEERS), LTD.,
Bamford, Via Sheffield.

'Phone: Bamford 25 & 34.
'Grams: Topical, Sheffield.
Works: Bamford, Derbyshire (L.M.S. Rly.).

3

FOR SALE.—*Continued.*

PLEASE NOTE.

WE would draw the attention of purchasers that we carry a stock of 500/1,000 Motors and Generators, both a.c. and d.c., from ½ h.p. to 100 h.p., and we only handle modern machines, which we guarantee for twelve months.

Please send your enquiries to:—

THE CENTRAL ELECTRICAL ENG. WORKS,
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CENTURY SINGLE PHASE MOTORS.

WE hold the largest stock of Repulsion-Induction Motors in England.

All sizes from ¼ h.p. to 30 h.p.

All frequencies from 25-100 cycles.

The ideal motor for Change-overs, Refrigerators, Pumps, and all domestic motorised machinery.

Sole Agents: ASEA ELECTRIC, LTD.,
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Send for Priced Stock List No. 118. Telephone: Holborn 6001. 1887

SALE, HIRE OR HIRE PURCHASE.

MODERN used Electric Motors, d.c. and a.c., with a 12-months' guarantee.
Rewinds and Repairs. Machines loaned during repairs.
"Change Overs" carried out.
E. P. ALLAM & CO., LTD.,
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A SPECIAL Offer.—D.C. Motors to clear, all sizes. From 10s. per horse-power.—1979, Electrical Review, 4, Ludgate Hill, London.

ALTERNATING and Direct Current Electric Motors, ¼ to 100 h.p., new and second-hand. First-class machines with full guarantee. Hire or sale.—Electro-Generator Co., 5, Uxbridge Road, Shepherds Bush, W.12. Riverside 0488. 9924

BARGAIN.—27-h.p. "Westinghouse" Compound Interpole, 460 V, new spare armature, 490 revs., fan ventilated. £35 lot, to clear.—1982, Electrical Review, 4, Ludgate Hill, London.

BARGAIN.—28-h.p. "Crompton" compound Interpole, 440 V, 850 revs. Date 1924. £25.—1980, Electrical Review, 4, Ludgate Hill, London.

BARGAIN.—225-h.p., 500-volt, 3-phase, 50-cycle, 363-rev., slip ring a.c. Motor, A.E.G. £125.—1978, Electrical Review, 4, Ludgate Hill, London.

COMPOUND Interpole Motors, two, 25 h.p., 500 volts, 850 revs., Mavor & Coulson. £25 each.—T.P., 12, Bevington Hill, Liverpool. 1981

DIX Onemeter 55 Range Meter, micro and amps., milli and volts, ohms and megs., all on one precision moving coil, 55s. meter. Accurate and marvellously cheap.—Leslie Dixon Instruments, 218, Upper Thames Street, E.C.4. 10

DYNAMO, 14 kW, 220 volts, 250 revs., £15. On site London. —1977, Electrical Review, 4, Ludgate Hill, London.

DYNAMOS, 215 kW, 230 V, 250 r.p.m.; Steam Set, 26 kW, 105 V, £60; Motors, 110 V, ¼ to 80 h.p. Bargains.—"Engineer," 22, Prince of Wales Terrace, Scarborough. 9958

ELECTRIC Motors and Dynamos for Sale, a.c. and d.c. Usual voltages. Selection of 300 machines, 7,000 b.h.p.—Manchester Armature Repair Co., Ltd., Ford Lane, Pendleton. 'Phone: Pendleton 151. 1717

FIRST-Class 50-h.p. B.T.H. Motor, 530 V, 900 r.p.m., with starter, £60; also 18-h.p. G.E.C., 690 r.p.m., £25.—F. Winkworth & Co., 64, Victoria Street, S.W.1. 1991

FOR Sale, Petrol, Paraffin, and Crude Oil Engines and Generating Sets for lighting and power; all voltages, a.c. and d.c., from 1-500 kW.—Fyfe, Wilson & Co., Ltd., 31, Budge Row, London, E.C.4. 1987

FOR Sale, two vertical Gas Engine Sets, with producers, and direct coupled 220-kW, 230-volt generators.—1974, Electrical Review, 4, Ludgate Hill, London.

FOR Sale, 3½ kwt., 50-volt E.L. Plant, self-contained, Gardner-E.C.C., with switchboard; splendid condition. What offers?—Gilling, 40, Wood Street, Westminster. 9949

FOR SALE.—*Continued.*

FOR Sale, four 40-h.p., 440-volt, 250/750-revs., compound, variable speed Motors.—1915, Electrical Review, 4, Ludgate Hill, London.

FOR Sale, Brush-Ljungstrom Turbo Set, 2,000 kW, 6,600 volts, 3-phase, 50 periods. New 1923.—1912, Electrical Review, 4, Ludgate Hill, London.

FOR Sale, 200-kW, 440-volt, 3-phase Steam Set, with condenser and switchboard. Purchaser to remove from present site.—1911, Electrical Review, 4, Ludgate Hill, London.

FOR Sale, 250-kW Belliss-Crompton Steam Generator, 440/550 volts, d.c.—Apply Borough Electrical Engineer, 36, Osborne Street, Colchester. 1993

FOR Sale, Dictograph 10-line internal telephone system, one master station, six sub-stations fitted, in perfect order.—Apply to The Power-Gas Corporation Ltd., Parkfield Works, Stockton-on-Tees. 2003

FOR disposal, 210-Ah Chloride Battery, 55 cells, with E.C.C. dynamo, switchboard and 200 lamps, only a few been used; installed 1926. Battery fully charged and dried off 1928. —Apply for view or particulars, Giddins, Electrical Engineer, The Ridge, St. Leonards. 9822

FOR Sale, two 300-kW, compound wound, 3-bearing Generators, 220 volts, 350 revs., with 5-panel switchboard. In first-class order. Price £400 the lot.—1187. Electrical Review, 4, Ludgate Hill, London.

FOR Sale, 375-h.p., 230-volt, 320 revs., compound, 3-bearing Motor.—221, Electrical Review, 4, Ludgate Hill, London.

FOR Sale, 75-kW, 110-volt, 500-revs. engine type Generator, by English Electric Co.—1913, Electrical Review, 4, Ludgate Hill, London.

GENERATING Plant, comprising 7½-h.p. Crossley Gas Engine, 3½-kW Newton Dynamo, polished slate Switchboard in teak frame, with Instruments and Premier Battery of 54 cells—installed three years ago. For sale as a whole, or would divide. Can be inspected at Brackley, Northants.—Apply Edward Millard & Co., Land Agents, 10, Union Court, Old Broad Street, E.C.2. 1954

GENERATOR, 500 volts, 180 amps., 500 revs., compound wound, 8-pole, "Brown-Boveri." Cheap, £60.—1983, Electrical Review, 4, Ludgate Hill, London.

LIGHTING Plants.—1, 2, 3, 3½ and 5-kW Austin, Standard, A.B.C. and Petter Petrol-Electric (direct-coupled) Generating Sets, 50-110 and 220 volts, from £25 each.—Inspect, Burleigh, 45, Hornsey Road, London, N. 'Phone: North 1675. 8

LISTER 8-h.p. Engine, almost new, mechanically sound.—9993, Electrical Review, 4, Ludgate Hill, London.

MODERN Turbo Set for Sale, 5,000 kW, 6,600 volts; also two 40,000-lb. per hour Babcock Boilers with auxiliaries. —1914, Electrical Review, 4, Ludgate Hill, London.

MOTOR Generator for disposal. Motor wound for 400 volts, 3-phase, 50 periods, direct coupled to generator wound for 125 volts, 90 amperes, running at 1,500 r.p.m. Could be used as a.c. motor to develop 20 h.p., and has shaft extension. —Hall, 1, York Street, Baker Street, W.1. Welbeck 2206. 1955

MOTOR-Generator for Sale. Motor, 460/500 volts, 50 amps. Generator, 25-30-40 volts, 300 amps., 850 revs. £32 10s. —1973, Electrical Review, 4, Ludgate Hill, London.

MOTORS and Dynamos in stock. Condition guaranteed.—Drummond & Co., Middlesbrough. 6

MOTORS by Lancashire D. & M. Company, condition guaranteed, two 10 h.p., shunt E.V., 460 volts, 890 r.p.m., with rails, pulley, and D.A. starter. What offers.—H. Holt, 43, Hall Gate, Doncaster. 1874

NAMEPLATES in Metal, Ivorine, &c. Bronze and Brass Doorplates.—Stilwell & Sons, 7, Jordan Well, Coventry. 14

NEW v.i.r. Cables, all sizes, 1/.044 to 61/103, also Armoured Cables. Cheap.—Edwardes Bros., 20, Blackfriars Road, London. 9985

'PHONE 98 Staines.—21-h.p. Crossley cold-starting Crude Oil Engine, 300 r.p.m., new 1923, with accessories.—Harry H. Gardam & Co., Ltd., Staines. 1984

PUMP Set, Mather & Platt, 650 g.p.m., 230 ft. head, 400/440, 3-ph., 50 per.—Greenhalgh Bros., Atherton. 1425

SPECIAL Lines of Switches, Lampholders, Ceiling Roses, Cut-Outs, Porcelain Cleats and Insulators up to 30,000 volts, with fittings. Conduit and fittings, Bells, Glass Shades and E.I. Reflectors, Strip Light, Wood Blocks, Heaters, Volt and Ammeters, Arc Lamp Carbons, Motors and numerous other lines at low prices.—Edwardes Bros., 20, Blackfriars Road, London. Send for Price List. 9986

STEAM and oil-engine-driven Generating Sets. Enquiries invited.—F. Winkworth & Co., 64, Victoria Street, S.W.1. 1992

15-KW Steam Generating Set, Belliss-Siemens, 110 volts, d.c. 12-kW ditto, by Allen, 110 volts, d.c. 5-kW ditto.—Harry H. Gardam & Co., Ltd., Staines. 'Phone 98. 1905

FOR SALE.—*Continued.*

55-H.P., 3-phase, 50-cycle Mather & Platt Motors, 400 V, with Ellison starters. Cheap.—Electric Plant Co., Thundersley, Essex. 9934

75-H.P., B.T.H., 500 V, d.c., D.H. type, 570/770 revs., £50. —T.P., 12, Bevington Hill, Liverpool. 1976

80-KW Steam Set, Howden-Phœnix, 440/500 V, 3-ph., 50 per.—Greenhalgh Bros., Atherton. 1725

100 HART "CLPL" type, 13-plate Glass Storage Batteries, 500 act. Ah, complete with stands, insulators, &c. Guaranteed in first-class condition; suit small power station or large country houses. Would separate.—Inspect, Burleigh, 45, Hornsey Road, London, N.7. 'Phone North 1675. 863

120-H.P. "Rhodes," 3-bearing on bedplate, 230 V, d.c., 800 revs., £75.—T.P., 12, Bevington Hill, Liverpool. 1975

140-KW Diesel Generating Set, 3-cylinder, with E.C.C. dynamo, 440 volts, d.c. 50-kW Lancashire Dynamo, 110 volts, 950 r.p.m. Weir Compound Feed Pump, 10,000 galls. per hour.—Harry H. Gardam & Co., Ltd., Staines. 'Phone 98. 1906

150 HIGHLY polished Electric Irons, universal voltage. To clear, 3s. 9d. each.—S. Korn, 131, Sandringham Road, Dalston. 9979

166-KW Phœnix Alternator, 3,000 V, 3-ph., 50 c., with exciter. 400-kW Mather & Platt Dynamo, single-bearing, 220 volts, 300 r.p.m. 140-kW ditto, by E.C.C., 440 volts, 300 r.p.m.—Harry H. Gardam & Co., Ltd., Staines. 'Phone 98. 1903

300-KW Steam Generating Set, Belliss-B.T.H., 500 volts, d.c. 150-kW ditto, Ashworth-Siemens, 440 volts, d.c. 26-kW ditto, by Allen, 110 volts, d.c. Ditto, 220 volts, d.c.—Harry H. Gardam & Co., Ltd., Staines. 'Phone 98. 1904

500-B.H.P. Diesel Set, 350-kW Alternator. 350-kW Alternator, 300-kW Generator. 5,000-kW Turbine, 6,600-V Alternator.—9962, Electrical Review, 4, Ludgate Hill, London.

675-KVA, oil-cooled Transformer, 6,600/440 volts, 3-phase, 50 periods, with tappings. Makers, Messrs. Ferranti, Ltd.—1831, Electrical Review, 4, Ludgate Hill, London.

ARTICLES WANTED.

Advertisements are inserted under this heading at 1½. per inch.

WANTED.

MESSRS. Edwardes Bros. wish to announce that they are open to purchase Surplus Stocks for net spot cash. Full particulars with samples will receive immediate attention.—Edwardes Bros., 20, Blackfriars Road, London, S.E. 'Phone: 2115 Hop. 9987

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ACCUMULATOR and other Metal Scrap, Glass Boxes, &c., bought for immediate cash. Top prices paid. Complete batteries bought on site.—Bentley, Brown & Co., 59, Gracechurch Street, London. Telephones: Royal 4818 and 4819. 1254

ASK us to buy your Scrap Electric Cable, old Plant, and non-ferrous Metals. Highest prices paid.—Jewell & Son, Oldbury, near Birmingham. Telephone: Oldbury 96. 15

BATTERIES (Storage), Old Dynamos, Transformers, Arc Lamps, Electric Meters. Scrap Cable, Metals, or Machinery of any description purchased. Distance no object.—A. Learoyd & Son, Bridge Works, Heatherley Street, Clapton, London. Telephone: Clissold 2278. Established 1860. 9360

KOHLER Plant, 800 watt, Model S, good condition, second-hand. State year purchased, price.—Red House, Snape, Suffolk. 9941

OIL Storage Tank, about 600 gallon capacity. Absolutely sound.—9992, Electrical Review, 4, Ludgate Hill, London.

ONE 750/500-kW reciprocating Steam Engine, 160 lb. pressure, with condenser, coupled to 460-volt d.c. generator.—9974, Electrical Review, 4, Ludgate Hill, London.

SCRAP Accumulator Plates and Sediment wanted. As actual smelters we pay top prices, any quantities. We also purchase and undertake dismantling of Storage Batteries. —Telephone or write, Elton, Levy & Co., Ltd., 30, Charterhouse Chambers, E.C.1. Clerkenwell 7811-2-3. 1181

SCRAP Ebonite.—Advertisers are open to buy large quantities of 3/16 and 5/16 Sheet Ebonite in any length or width over 1½ in.—State quantity and make to 1823, Electrical Review, 4, Ludgate Hill, London.

SCRAP Metal, Copper, Brass, Accumulator Plates, Sediment, Ebonite, Cable, Iron and Steel, Old Plant and Machinery for dismantling. Terms cash.—W. & H. Cooper, Ltd., Brady Street, Bethnal Green, E.1. Bishopsgate 7288-9. 9594

ARTICLES WANTED.—*Continued.*

STEAM Generating Set, 220 volts, 50/60 kW, d.c., 100 lb. steam pressure. State price, age, and full details. Also 100-h.p., 3-ph., 25-cycle, 440-volt Induction Motor.—Wilcock, Ltd., Cowper Street, Birmingham. 9961

WANTED, Pumping Set, to give 650 gallons per minute against 230 ft. head, direct coupled to a 3-phase, 50-period, 400/440-volt motor.—Mylan & Smith (Engineers), Ltd., Bamford, Derbyshire. 1970

WANTED, 20, 30, 60, 100 h.p., Slip-ring Motors, suitable for 500 to 550 volts, 3-phase, 50 periods, complete with starting gear. Must be cheap to be of interest.—Apply 2008, Electrical Review, 4, Ludgate Hill, London.

WANTED, modern Crude Oil Set, about 100 kW, 220 volts, or Engine only. Must be either Willans or Mirrlees make.—1916, Electrical Review, 4, Ludgate Hill, London.

WANTED, good Second-hand 100-kW Crude Oil Engine and 230-volt d.c. Dynamo. State price and where can be seen running.—McWhirter & Sons, Ltd., Cardiff. 1937

WANTED, urgently, two 3-kW, 100-volt petrol-paraffin Lighting Sets, with Battery, in first class condition. Send particulars and lowest price.—Fyfe, Wilson & Co., Ltd., 31, Budge Row, London, E.C.4. 1988

WE are open to buy Japanese Flashlamp Bulbs and Japanese Lanterns. Offers from manufacturers' agents or direct importers only to Chiffre.—9980, Electrical Review, 4, Ludgate Hill, London.

4-KW shunt wound Generator, 300 volts.—Peacock, Fairbourne, N. Wales. 9959

AGENCIES.

Advertisements are inserted under this heading at 1s. 9d. per line.

AGENTS required by electric lamp firm. Valuable accounts already established. Remunerative proposition to live men.—1972, Electrical Review, 4, Ludgate Hill, London.

AGENTS wanted in Glasgow, Birmingham, Bristol, and Dublin for well-advertised wireless and electrical components.—9926, Electrical Review, 4, Ludgate Hill, London.

LEADING firm of industrial fittings manufacturers, specialising in street lighting equipment, industrial reflectors, &c., are prepared to consider applications for Agency for Derbyshire and Nottinghamshire; also other districts.—Particulars to 1889, Electrical Review, 4, Ludgate Hill, London.

TRAVELLERS wanted to sell non-combine electric lamps. Districts vacant:—Staffs., Midlands, Yorks., and the North of England. Only men who have an established connection among the mills, factories, and large users need apply.—Box 153, Ashburners, Ltd., 10, Piccadilly, Manchester. 1971

WHOLESALE electrical firm, specialising in electric lamps and other electrical goods, desire Agencies from manufacturers, British and foreign goods. Fine premises in E.C. district, London. Wonderful window display, large showrooms. Every facility for carrying large stocks and despatching goods. —Write 9954, Electrical Review, 4, Ludgate Hill, London.

BUSINESSES FOR SALE AND WANTED.

Advertisements are inserted under this heading at 1s. 9d. per line.

ELECTRICAL and Radio Business; genuine offer. £500. Stock at valuation. Maidenhead.—1962, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL and Wireless Business. Must be sold. Take £500 all at, or near offer. Turnover £2,000 to £2,500, and could be doubled. Established 9 years. North London corner shop with 5 years' lease.—9991, Electrical Review, 4, Ludgate Hill, London.

ELECTRICAL Contracting and Wireless Business for Sale; established 28 years, in Surrey. Principals only.—9877, Electrical Review, 4, Ludgate Hill, London.

FOR Sale, small Electrical and Mechanical Engineering Business.—Leggett, River Road, Littlehampton. 1999

OLD-Established Electrical Business; large workshops, freehold premises, or Let on lease; situated in centre market town. Main 'bus depot; good live business. No dealers.—Apply 9897, Electrical Review, 4, Ludgate Hill, London.

WORK WANTED AND OFFERED.

MANUFACTURING Facilities.—Important electrical manufacturing firm in London has small separate works available, with modern equipment, including coil winding plant, for quantity manufacture of light electrical apparatus, domestic appliances, radio material, &c. Could undertake manufacture of electrical specialities for proprietary firms.—Write 1985, Electrical Review, 4, Ludgate Hill, London.

PARTNERSHIPS.

Advertisements are inserted under this heading at 1s. 9d. per line.

ACTIVE interest or Directorship with remuneration, offered by wholesale electrical house (limited company) to really capable man who is able to invest capital for expansion of business. Applicant must have technical and practical experience, and be absolutely conversant with all branches of the trade.—State full particulars in reply to 9955, Electrical Review, 4, Ludgate Hill, London.

BANK Official (retired) procures Capital for new or established companies from clients prepared to invest £2,000 to £5,000 each, with directorship. Proofs available of investments of £700,000 made by clients.—Write Box 1392, Pool's, 180, Fleet Street, E.C.4. 1990

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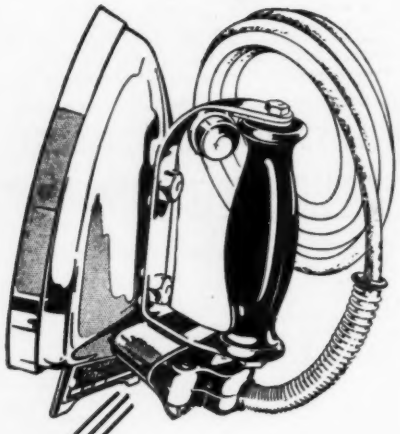

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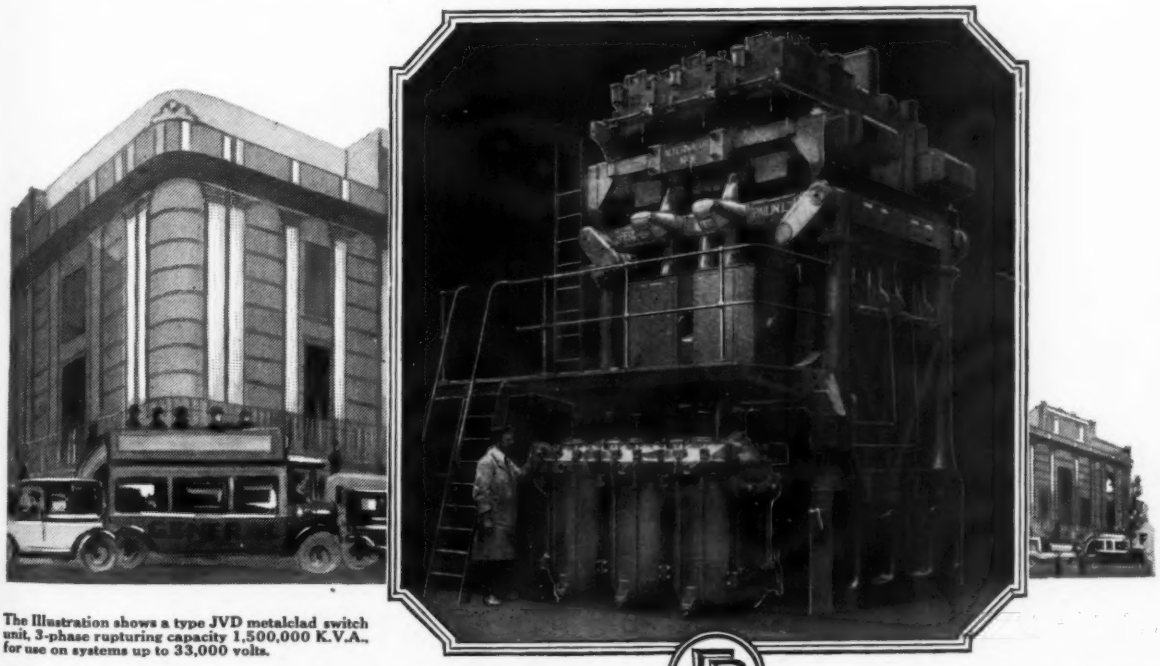

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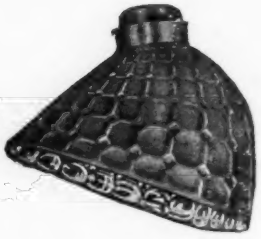

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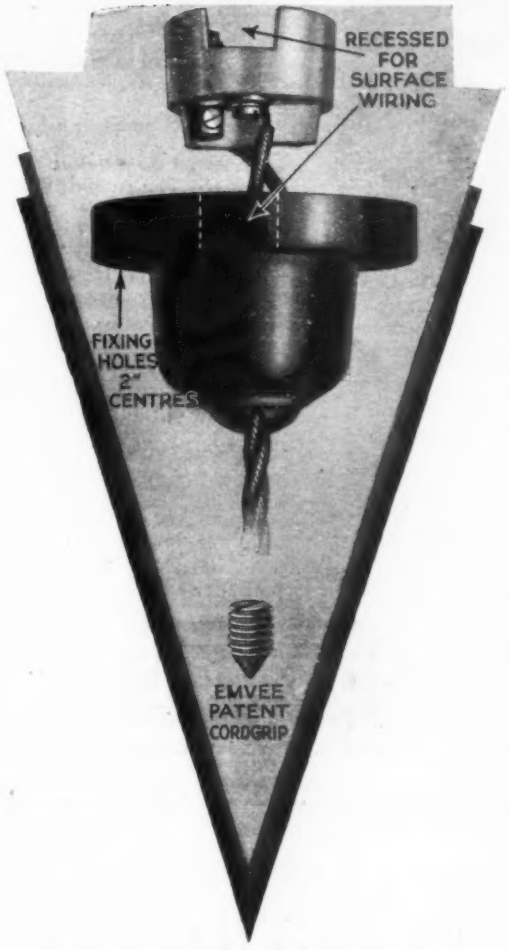

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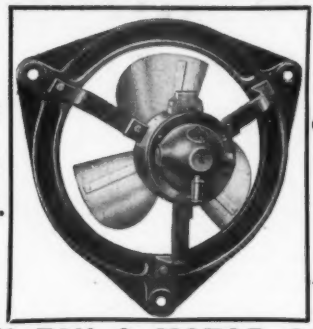

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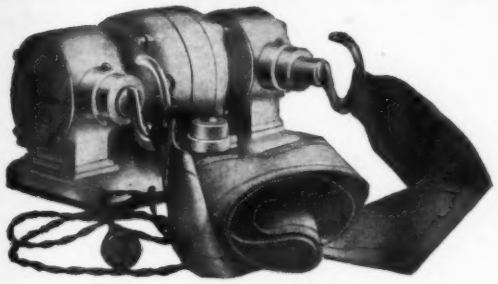

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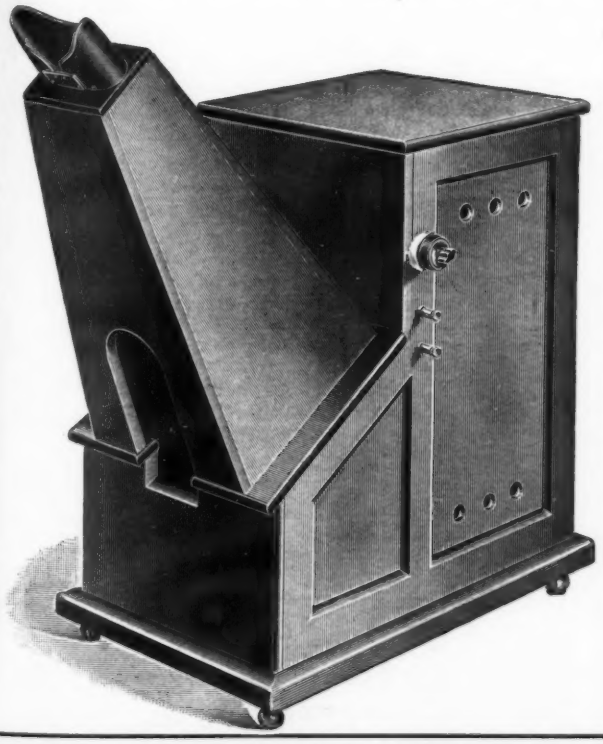

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ELECTRICITY (SUPPLY) ACT, 1926.

North-East England Electricity Scheme, 1929.

WHEREAS the Electricity Commissioners have prepared and transmitted to the Central Electricity Board a scheme bearing the above short title and relating specifically to—

The Administrative Counties of Durham and Northumberland;

Parts of the Administrative Counties of the East Riding of Yorkshire and the North Riding of Yorkshire;

The City and County Borough of Newcastle-upon-Tyne;

The County Boroughs of Darlington, Gateshead, South Shields, Sunderland, Tynemouth, Middlesbrough, and West Hartlepool;

and dealing with the matters mentioned in Section 4 (1) of the Electricity (Supply) Act, 1926.

Notice is hereby given that the Central Electricity Board have caused the said scheme to be published, and that any authorised undertakers or other persons interested in the said scheme and desiring to make representations thereon may do so by forwarding the same by registered letter addressed to the undersigned and posted not later than the 30th day of July, 1929.

Copies of the said scheme and of a volume of particulars supplementary thereto may be obtained at the prices of one shilling and sixpence and three shillings and sixpence each, respectively, from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2, and 120, George Street, Edinburgh.

Dated this 24th day of June, 1929.

RICHARD H. FOX,
Secretary to the Central Electricity Board.

Trafalgar Buildings,
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Application for inclusion in the list from which selection will be made should be addressed in the first place to:—

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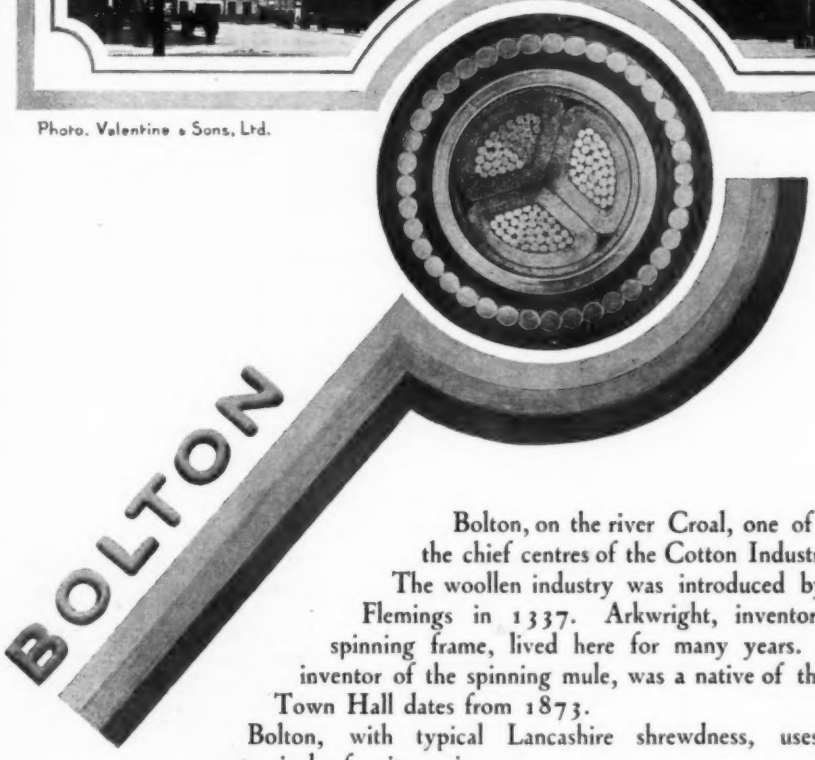

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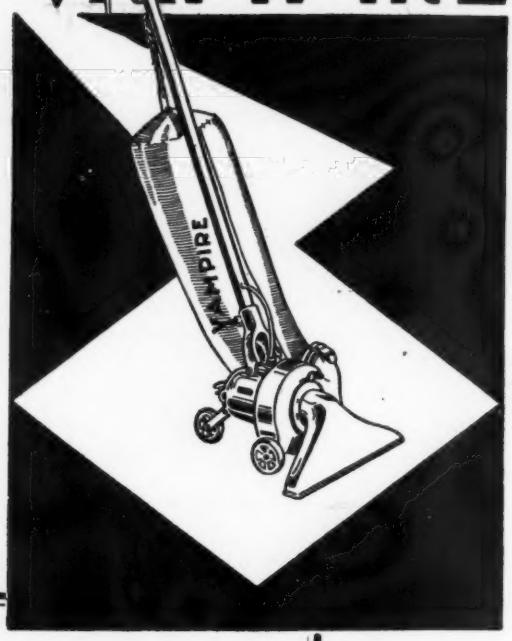

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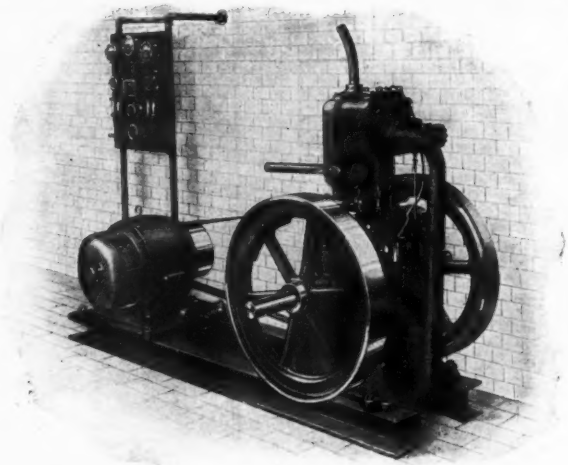

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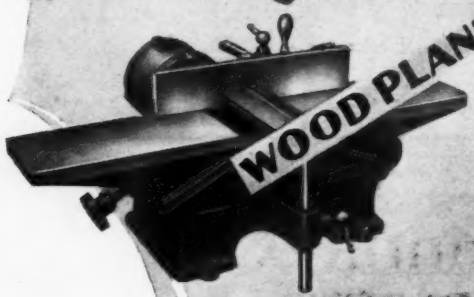

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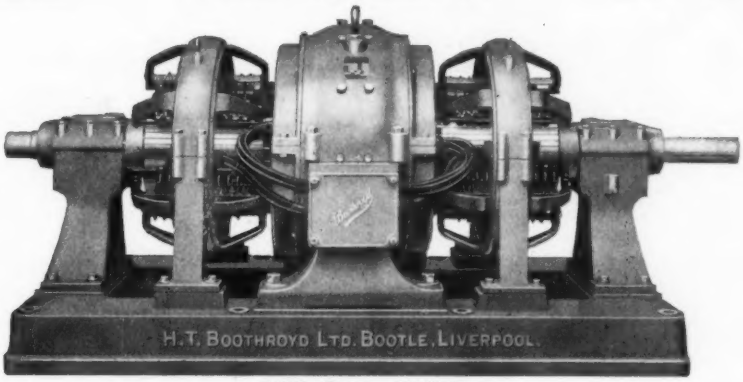

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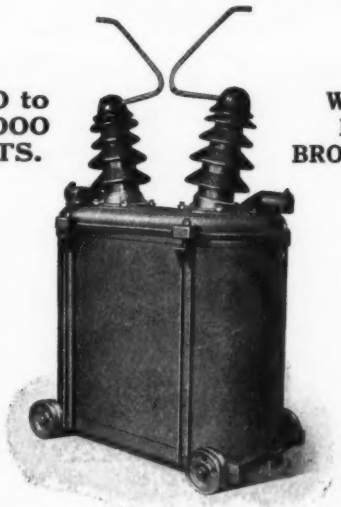

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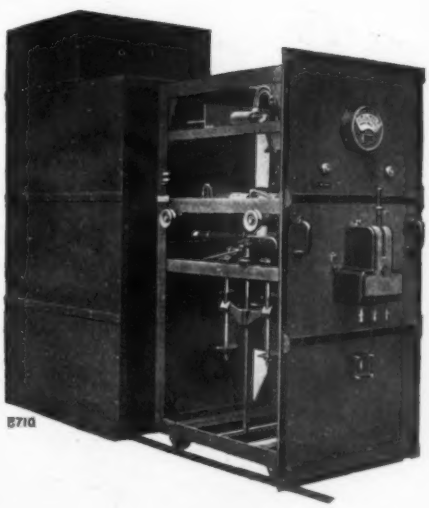

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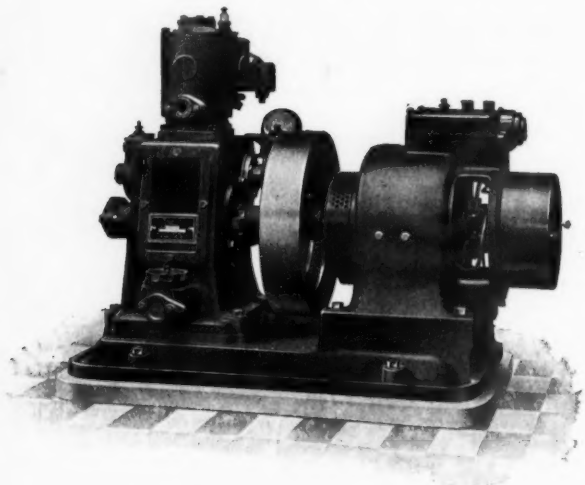

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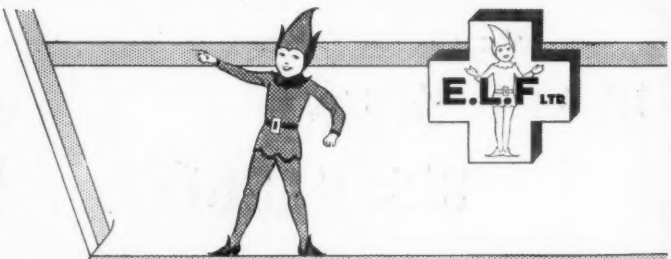

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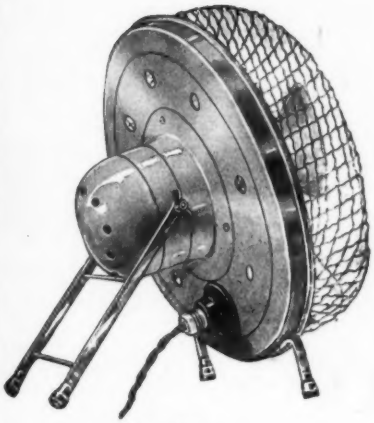

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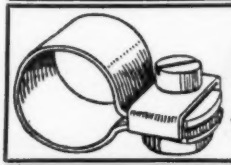
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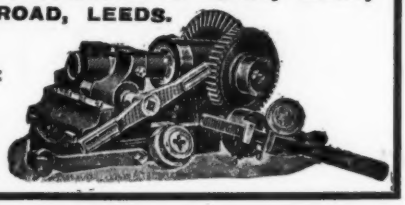

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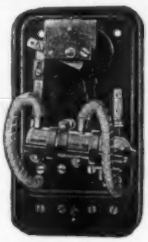

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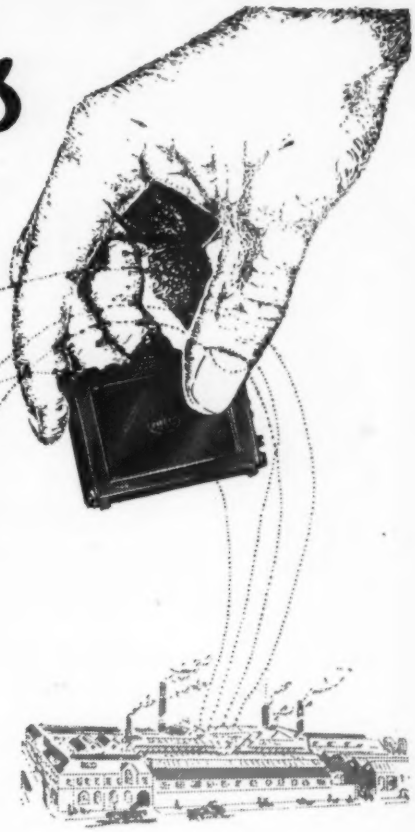

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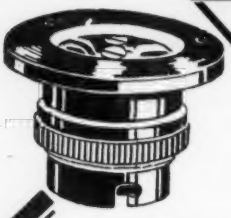
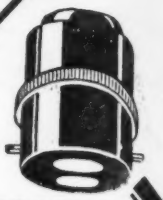
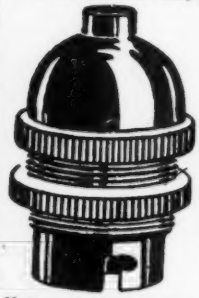
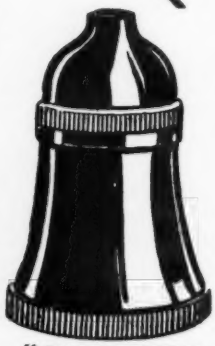


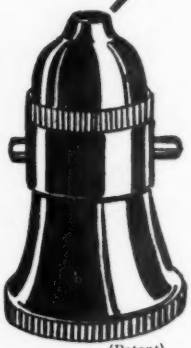


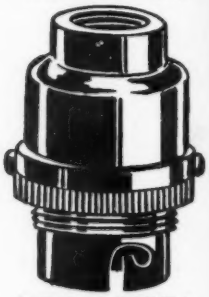
"GOLTONE"
SHADE RING PATTERN.
Batten Type.
List No. **A4/51.**
15/6 per doz. *Subj.*

"GOLTONE"
MOULDED ADAPTOR
Effective Cord Grip.
List No. **A2/56.**
6/8 per doz. *Subject.*









"GOLTONE"
SHADE RING PATTERN
CORD GRIP.
List No. **A4/37.**
12/- per doz. *Subject.*

"GOLTONE"
SHIELD SHADE CARRIER CORD GRIP. List No. **A4/36.**
15/- per doz. *Subject.*

(Patent).
"GOLTONE" SHADE RING PATTERN CORD GRIP SWITCH HOLDER. List No. **A4/41.**
£1 : 12 : 0 per doz. *Subj.*

(Patent).
"GOLTONE" SHIELD SHADE CARRIER CORD GRIP SWITCH HOLDER. List No. **A4/42.** **£1 : 16s.** per doz. *Sub.*

"GOLTONE"
SHADE RING PATTERN.
SCREWED.
Conduit ⅜", ½"& ¾" Brass ⅜"& ½".
List No. **A4/38.**
14/6 per doz. *Subject.*

"GOLTONE" (Regd.)

INSULATED HOLDERS AND ADAPTORS

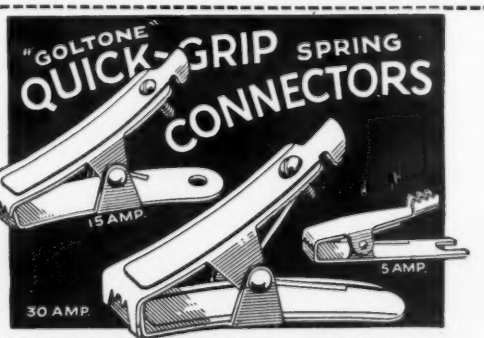
an all-British product.

The features of the "GOLTONE" Insulated Holders and Adaptors are neat appearance, **mechanical strength,** effective design, and reasonable prices, and above all ***safety in use.*** Particular attention is directed to the Switch Holder (which is no larger than an ordinary brass holder), is safe, and should be used on every installation where a switch holder is required. In the interest of safety and security ***USE "GOLTONE" INSULATED HOLDERS AND ADAPTORS.***

IMPORTANT

"Goltone" Insulated Holders are supplied with Metal (Patent Applied) reinforcing tubes, and have the insulating material moulded over the metal, making them not only shock-proof, but practically unbreakable.

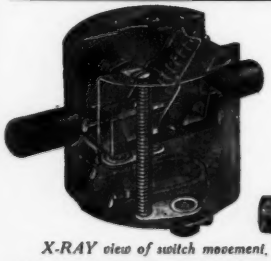
List with full particulars sent on request.

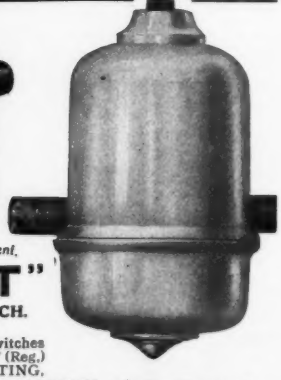


"GOLTONE" QUICK-GRIP CONNECTORS.
Invaluable for making a quick and certain connection to accumulator and other terminals.
"GOLTONE" QUICK-GRIP CONNECTORS, 15-amp. and 30-amp. sizes. The lead coating on these grips protects them from corrosion and the saw-shaped teeth grip the terminals tightly, ensuring good contact. R40/137, 15-amp., **5/6** doz. R40/138, 30-amp., **7/6** doz.

"BANQUO" (Regd.) SWITCHES and PLUGS

are installed in the largest and most important Engineering Works and Factories in GREAT BRITAIN.





X-RAY view of switch movement.

"IVORANT"

REGISTERED
1-and 2-way. PEAR SWITCH.
Quick Double Break.

The containers for these Pear Switches are moulded from our IVORANT (Reg.) material which is HEAT-RESISTING, NON-SOFTENING, of HIGH INSULATION and attractive appearance. Supplied in the following colours:—Ivory-White, Black, Coral-Pink, Rose, Brown Orange and Wedgwood Blue.

The switch movement, mounted on best English China, is of the quick make and break type. Reliable in action, it serves equally well as a 1-or 2-way Pear Switch. List No. S.F./80. Black or Brown **2/-** each, subject. Other colours 10% extra **2/3.**

Send for Catalogue A/108.

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WATERPROOF COMBINED INTERLOCKING.

Reliable and substantial design, Iron Base—screwed for conduit—with 2-pin and earthing plug, enclosed in gun-metal case and fitted with cord grip. A cap, fitted with chain, protects the current-carrying parts when plug is out.
There is no sturdier and better Switch Plug for Factory use than "BANQUO" (Improved model).

No. A13/10.	5 Amps.	Without Plug.	10/6 each.
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No. A13/130	15 Amps.	Extra for 3-pin Plug in Gun-Metal Case	7/6 "

Prices Subject Trade Discount.

"BANQUO" IRONCLAD SWITCH.

Robust Design. Neat Appearance.

Drilled and screwed for conduit. Also made in multiple ways.

SINGLE POLE, 5 amps. cap.
1 way 5/6
DOUBLE POLE, 5 amps. cap.
1 way 9/-
SINGLE POLE, 10-15 ams. cap.
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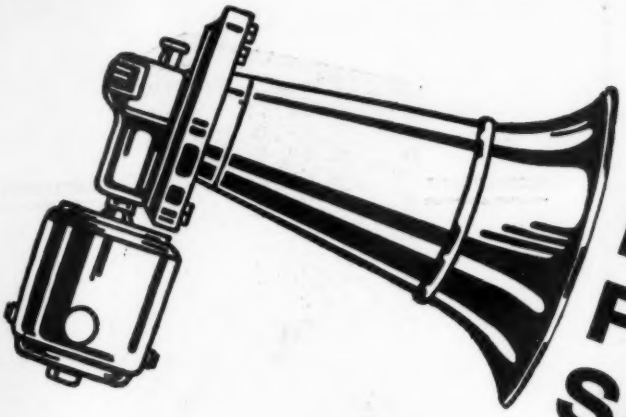

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HALF-A-MINUTE late in starting—half-a-minute early in stopping—minutes pile on minutes—and minutes lost per employee mean thousands of pounds lost in a year.

Klaxon signals keep workers punctual. Klaxon signals are worked from the clock—on the very tick comes their message—saving time—saving money. In an emergency—fire—employees are warned—effectively—for the Klaxon sawtooth note commands attention—it stands out amidst a medley of bells, buzzers and sirens.

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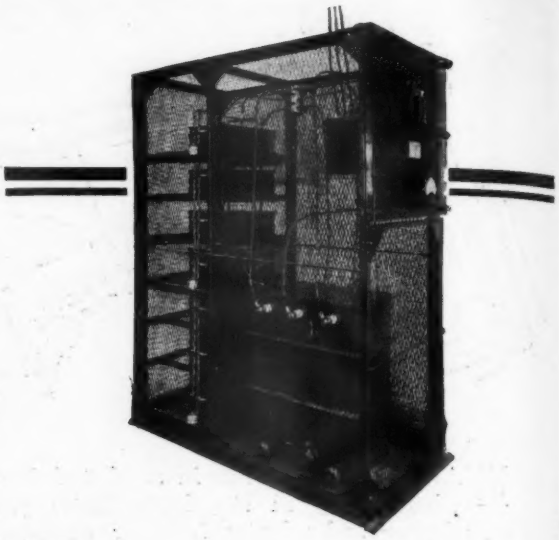

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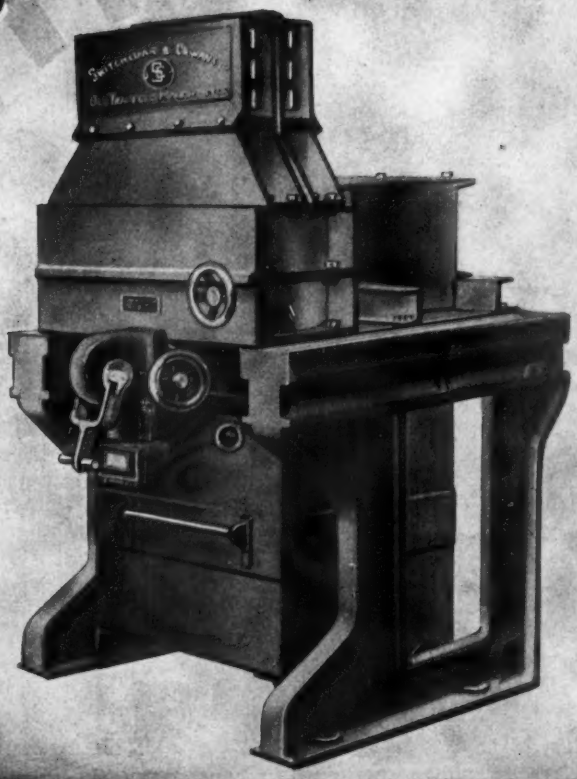

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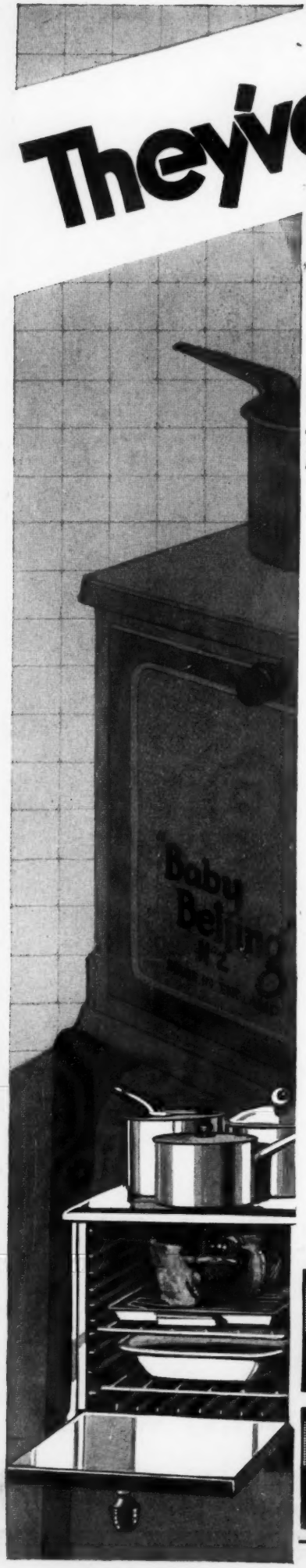

No. 3 *of a series of Testimonial letters.*

Below is another of the many testimonial letters received from Electric Supply Authorities who have introduced the Baby Belling Cooker to householders in their district.

They have proved that this little cooker is no nine days' wonder but a proved success.

"ALL CLIENTS WHO ARE USING THE NO. 2 BELLING COOKERS ARE VERY PLEASED INDEED WITH RESULTS AND SEVERAL WHO HAVE SEEN THE COOKERS IN THE SHOWROOM ARE BUYING THEIR OWN. I HAVE TESTED THE ONE HERE AND IT CERTAINLY COOKS TO PERFECTION; ALSO THE BOILING PLATE IS VERY QUICK AND EFFICIENT."

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BABY BELLING

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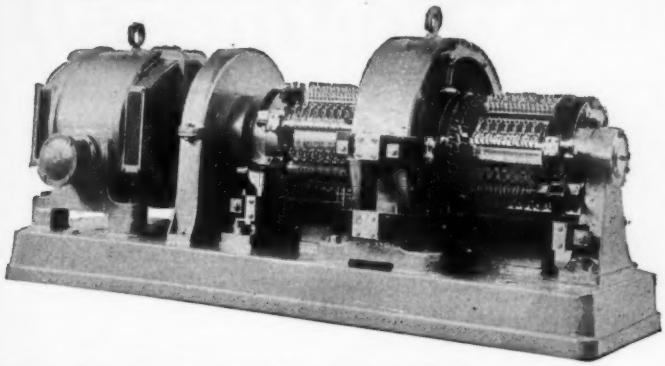

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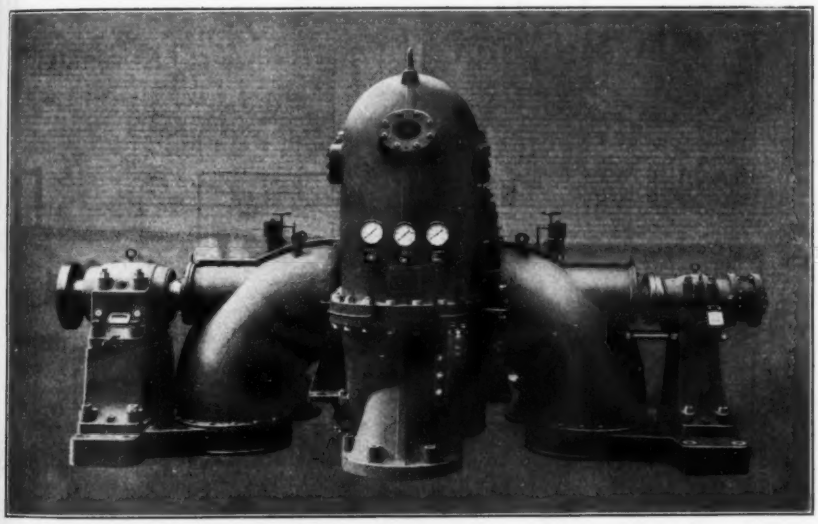

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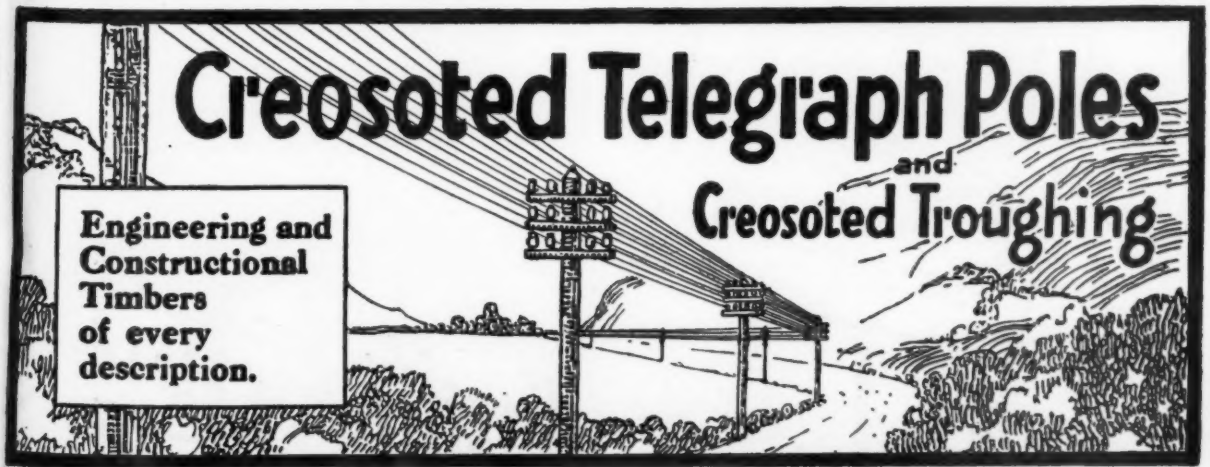

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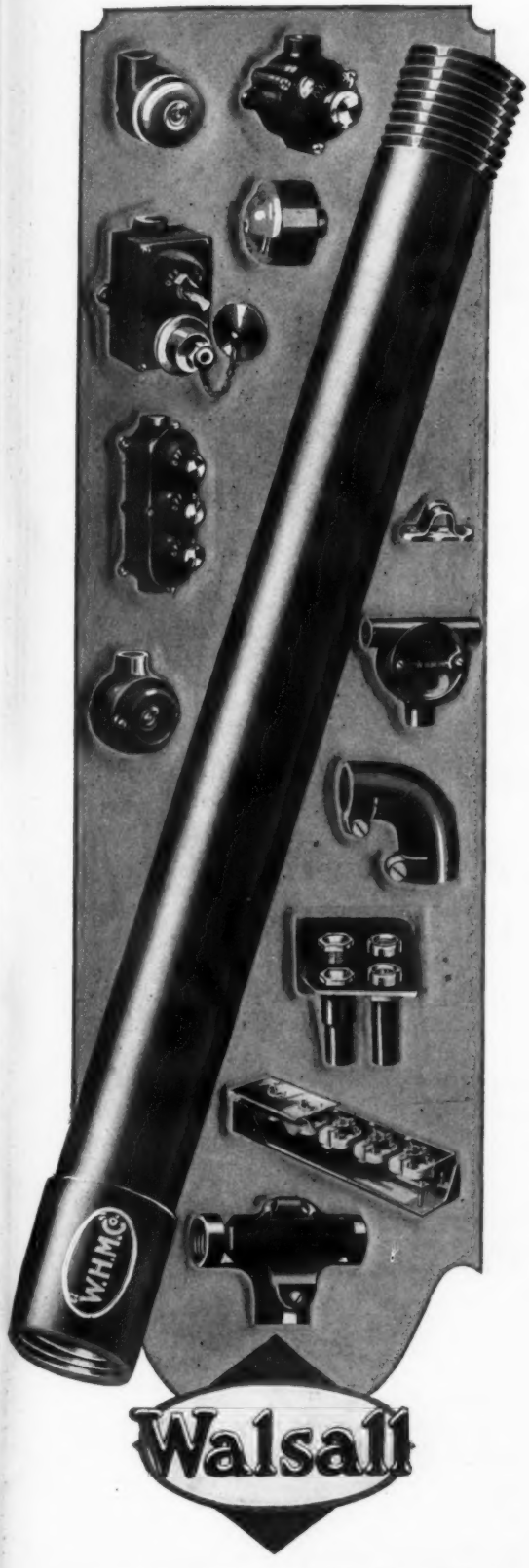

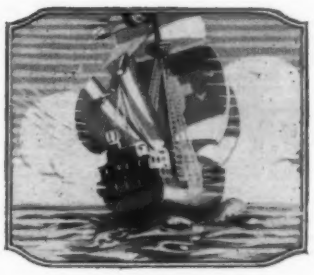

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MOVING IRON INSTRUMENTS

For Alternating or Direct Current.

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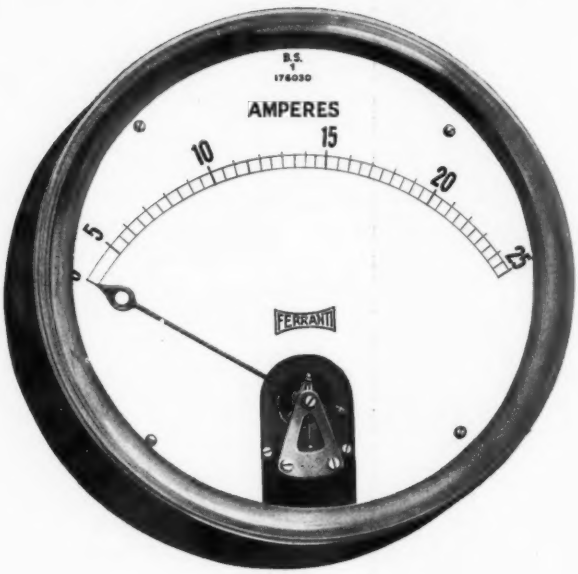

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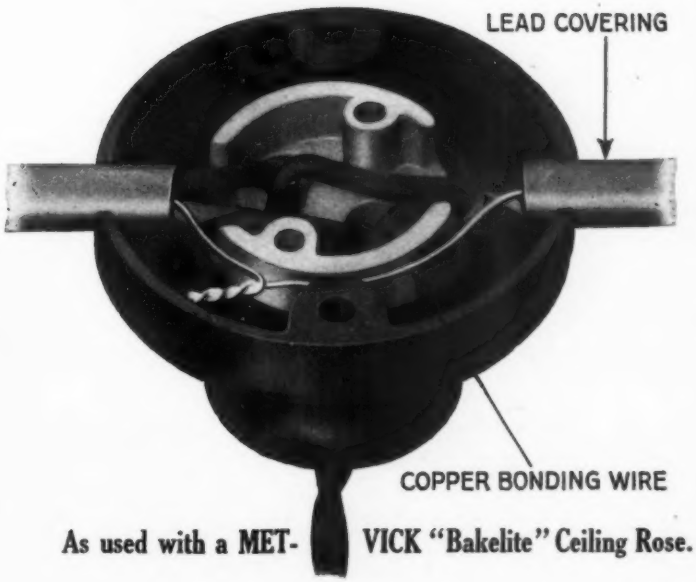
Glovers Lighting Cables

PATENT 236786

Risk of loosened Earth Screws is eliminated. Wood or any form of pattress can be used.

No Special Fittings Required

The incorporation of a copper bonding wire in direct contact with the lead sheathing ensures electrical continuity



As used with a MET-VICK "Bakelite" Ceiling Rose.

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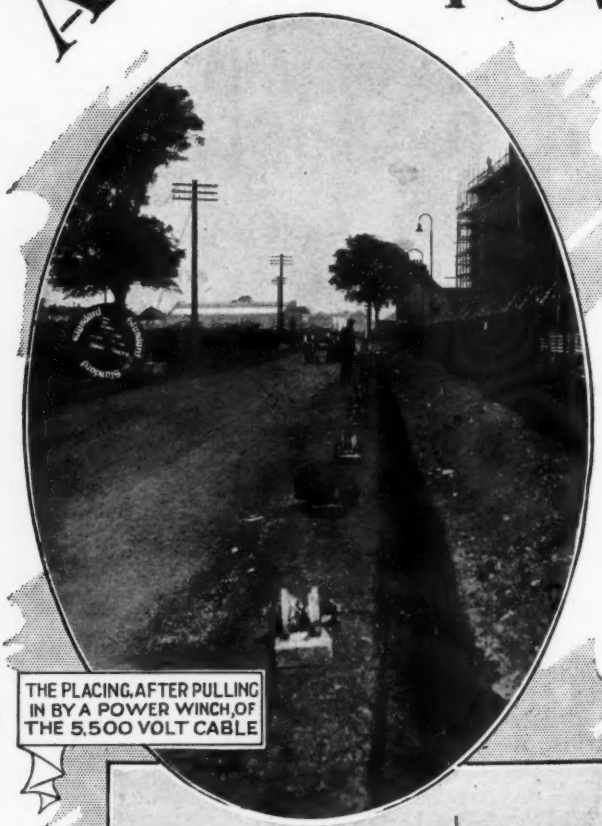
A reliable cable installation
Standard
POWER CABLE.



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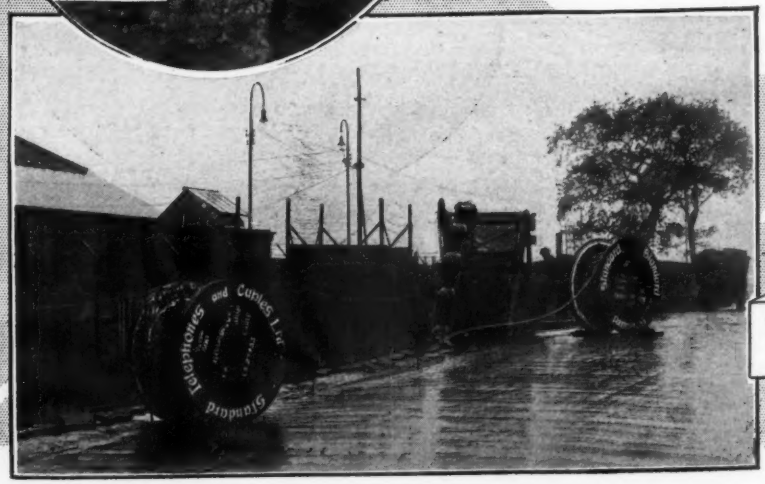

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„ 2b ...	25 × 14 ins. ...	36 × 21 ins.	
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„ 4 ...	31 × 20 ins. ...	36 × 27 ins.	
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„ 6 ...	42 × 24 ins. ...	61 × 38 ins.	74½ ins.
„ 7 ...	36 × 30 ins. ...	46 × 30 ins.	65½ ins.
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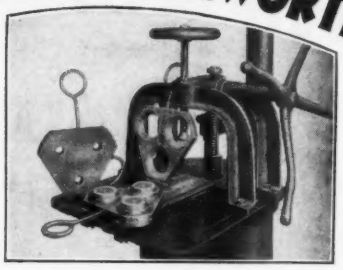

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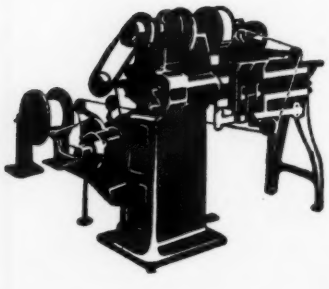

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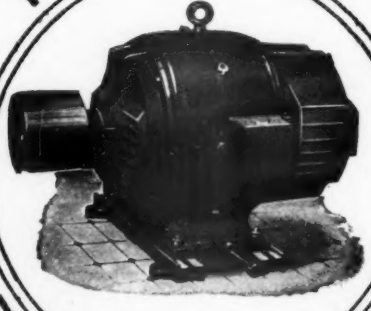

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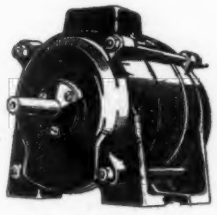

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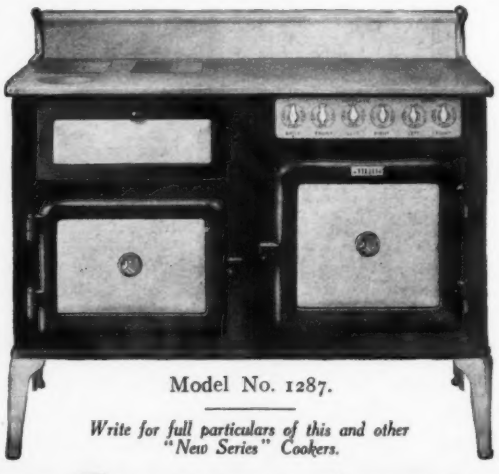

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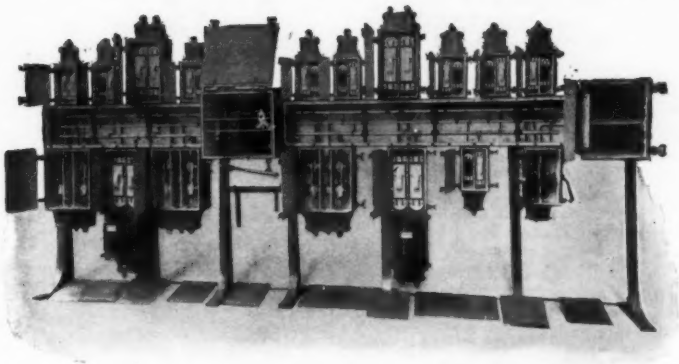

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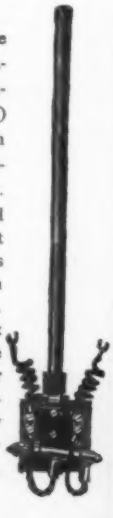

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GREENLY'S

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The names of Advertisers whose Announcements are ordered for a series are entered under any one Heading in this Index Free of Charge, but if repeated under existing headings **1s.** per week is charged for each additional entry.

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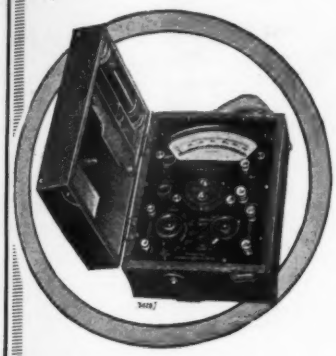

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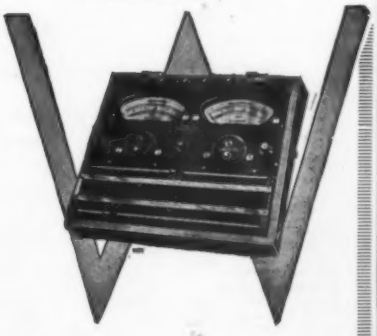

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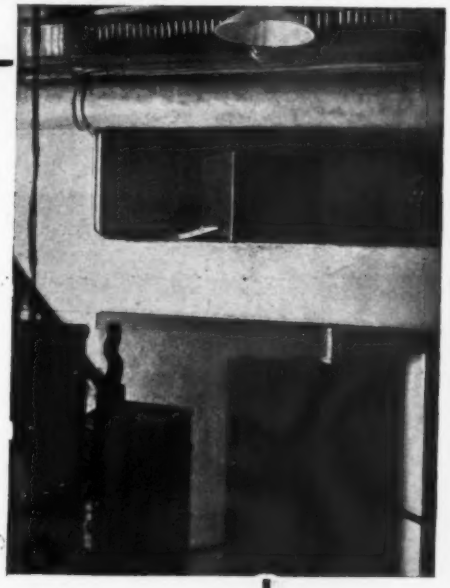

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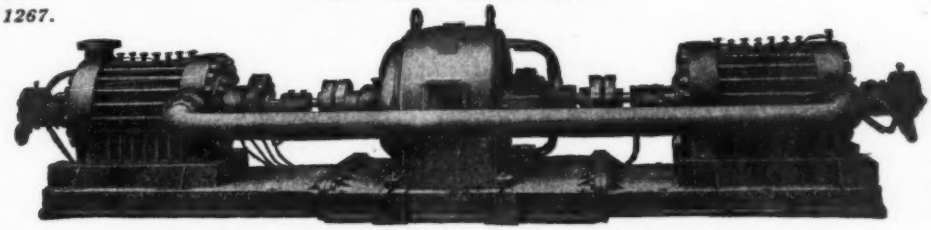

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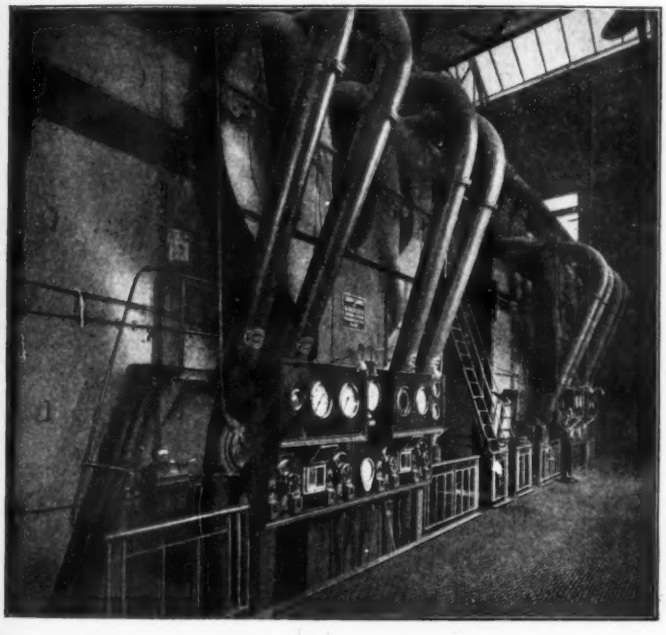

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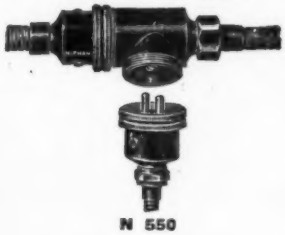

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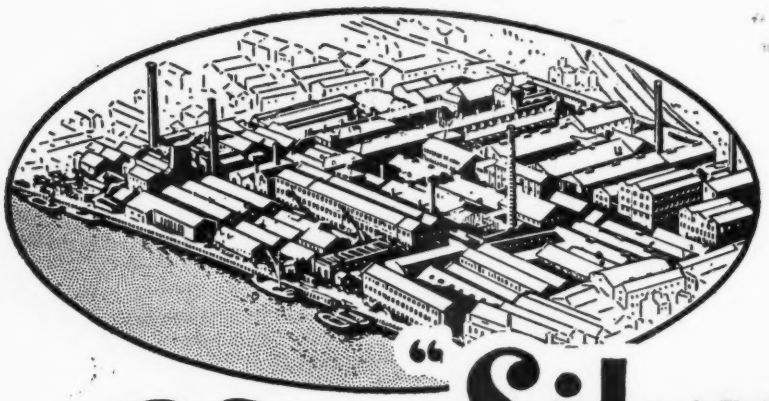

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